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Marine Isopod Crustaceans Collected from Shijiki Bay, Western Japan (1)
Valvifera, Cymothoida, Sphaeromatidea, Limnoriidea and Oniscidea*

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長崎県志々伎湾産等脚目甲殻類(1)

ヘラムシ亜目、ウオノエ亜目、コツブムシ亜目、キクイムシ亜目及びワラジムシ亜目

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東幹夫博士(調査当時は長崎大学)が長崎県平戸市志々伎湾で行った底生生物の一連の生態学的調査の際に採取された等脚目甲殻類標本を調査した。この標本は1984年5月10-12日に SMgrab と NSU-II を使って51定点を調査で得られたサンプルをはじめ、同湾での一連の調査の採集品からなる。また、筆者が同海域の潮間帯の調査を行ったのであわせて報告する。今回は第1報としてうちヘラムシ亜目、ウオノエ亜目、コツブムシ亜目、キクイムシ亜目、ワラジムシ亜目を調査したところ32種を確認した。うち、*Symmus azumai* n.sp. [アズマヤリボヘラムシ、新称]、*Neastacilla longipectus* n.sp. [ムネナガヒメナナフシ、新称]、*Arcturina plumbiformis* n.sp. [ハトガタヒメナナフシ、新称]、*Eurydice saikaiensis* n.sp. [サイカイナギサスナホリムシ、新称]、*Metacirolana shijikiensis* n.sp. [シジキスナホリムシモドキ、新称]、*Sphaeroma rotundicaudum* n.sp. [マルオコツブムシ、新称]、*Limnoria hiradoensis* n.sp. [ヒラドキクイムシ、新称] の7種が新種あることが判明した。なお、*Arcturina* 属は日本近海で初めての記録である。

なお、東幹夫博士らの志々伎湾での調査は農林省西海区水産研究所(現、独立法人水産総合研究センター西海区水産研究所)による。当時は東博士が指導した多くの学生や多くの研究者などの協力により集められたものである。また、今回の研究は2007年の潮間帯の調査を含めて第15回藤原ナチュラリヒストリー振興財団助成の研究費によるものである。

キーワード：等脚目、コツブムシ、オニナナフシ、キクイムシ、志々伎湾、新種

Key words : Isopoda, Sphaeromatidae, Arcturidae, Limnoriidae, Shijiki-Bay, new species

During a series of ecological researches (Azuman and Jinno, 1980, Azuma *et. al.* 1985, Azuma and Katsumura, 1984), Dr. Mikio Azuma, Professor Emeritus of Nagasaki University had collected many specimens of marine organisms collected from Shijiki Bay, Hirado-Island, Nagasaki Prefecture, western Japan. And the specimens belonging to the isopod crustaceans were sent to me, I could have a chance to examine them. The work was supported by a grant-in-aid from Saikai Regional Fisheries Research Laboratory. I will report the result of my study, they proved to include 32 species and 7 of them were proved to be new to science.

*Contributions from the Toyama Science Museum, No.344

Order Isopoda

Suborder: Valvifera

Family Idoteidae

Synidotea laevidorsalis (Miers, 1881) [J. n.: Waraji-heramushi]

Material examined: 1♂16♀♀, Ildaura, June 22, 1986, coll. Mikio Azuma; 1♂1♀, Tanoura, May 11, 1982, coll. Mikio Azuma.

Cleantiella isopus (Grube, 1883) [J. n.: Iso-heramushi]

Material examined: 3♂♂4♀♀, Shijiki-machi, intertidal, June 6, 1994, coll. Noboru Nunomura; 5♂♂1♀, Shijiki-machi, intertidal, June 7, 1994, coll. Noboru Nunomura; 5♂♂6♀♀, shore between Ooshijiki and Megazaki, intertidal, Aug. 27, 2007, coll. Noboru Nunomura; 1♂1♀, Semi-zaki, intertidal, Aug. 27, 2007, coll. Noboru Nunomura; 7♀♀, Oda, intertidal, Aug. 27, 2007, coll. Noboru Nunomura.

Cleantiella strasseni (Thielemann, 1910) [J. n.: Ohiraki-heramushi]

Material examined: 2♀♀1 young, Shijiki Bay, sand 8 m depth, May 12, 1984, coll. Mikio Azuma; 1♀, Shijiki Bay, sand 8 m depth, May 12, 1984; 1♀, Shijiki Bay (St. 51), coll. Mikio Azuma; 4 youngs, Tanohama, Shijiki Bay, (Mt. 15), June 12, 1977, coll. Mikio Azuma.

Family Holognathiidae

Cleantioides planicauda Benedict, 1899 [J. n.: Hoso-heramushi]

Material examined: 1♂1♀1 young, Shijiki Bay (St. 35), coll. Mikio Azuma; 1♀, Ildaura, June 22, 1986, coll. Mikio Azuma; 1♀, Shijiki Bay (Mt. 14), May 12, 1977, coll. Mikio Azuma; 2♀♀, Tanoura, May 11, 1982, coll.

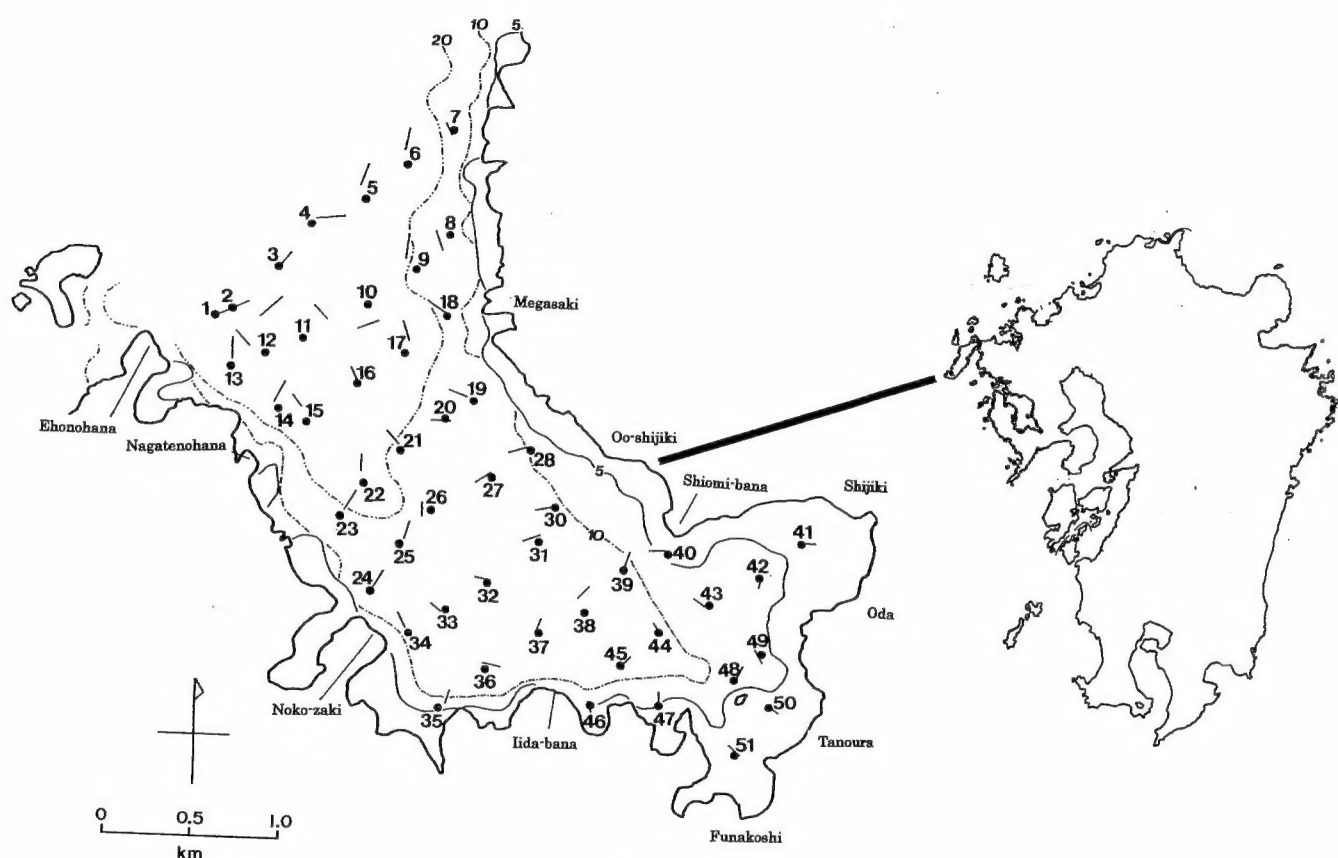


Fig.1 Map showing the sampling site. The map of Shijiki Bay was drawn originally by Dr.Azuma.

Mikio Azuma; 1 young, Shijiki Bay (St. 36), May 12, 1984, coll. Mikio Azuma.

Family Chaetilidae

***Symmus caudatus* Richardson, 1904 [J. n.: Yaribo-heramushi]**

Material examined: 1♀ 2 youngs, Shijiki Bay (Mt. 7), June 22, 1977, coll. Mikio Azuma; 1♀ Shijiki Bay, (Mt. 3), 18m, June 12, 1977, coll. Mikio Azuma; 3♀♀, Shijiki Bay (Mt. 9), June 12, 1977, coll. Mikio Azuma.

***Symmus azumai* n. sp. [J. n.: Azuma-yaribo-heramushi, new]**

(Figs. 2 and 3)

Material examined: 3♂♂ (1♂ holotype, 6.8 mm in body length and 2♂♂ 6.8-9.0 mm in body length) and 2♀♀ (1♀, allotype, 9.0 mm in body length and 1♀ paratype, 7.5 mm in body length, off Shijiki Bay, Nagatenohana (St. 15), 31m depth, May 13, 1984, coll. Mikio Azuma, and 3♂♂ (paratypes, 7.2-11.0 mm in body length), Shijiki Bay, off Shijiki Bay (St. 22), 25m depth, sand, coll. Mikio Azuma. Type series is deposited as follows: holotype (TOYA Cr-13636), allotype (TOYA Cr-13637) and 3 paratypes (TOYA Cr-13638~13640) at Toyama Science Museum; 5 paratypes (OMNH Ar-7609) at Osaka Museum of Natural History, and 4 paratypes (NSMT Cr-17979) at National Museum of Nature and Science, Tokyo. Other specimens: 1♂3♀♀, Shijiki Bay (St. 14), 32m depth, May 10, 1984, coll. Mikio Azuma; 2♀♀, Shijiki Bay (St. 10), May 10, 1984, coll. Mikio Azuma; 1♂, Shijiki Bay (St. 5), May 10, 1984, coll. Mikio Azuma; 4♀♀, Shijiki Bay (St. 17), May 11, 1984, coll. Mikio Azuma; 2♀♀, Shijiki Bay (St. 29), May 11, 1984, coll. Mikio Azuma.

Description: Body 2.5 times as long as wide. Color pale yellow in alcohol. Cephalon with lateral area expanded. Eyes small, each eye composed of 4 ommatidia. Pereonal somites with a row of medial round process. Pereonal somite widest at somite 3, posterior two pleonal somites narrow. Pleotelson tapering toward the tip, but apical area rounded, apical area with a bundle of setae.

Antennule (Fig. 2C) 4-segmented; terminal segment with 3 aesthetascs and several setae at the tip. Antenna (Fig. 2D) almost as long as antennule and 5-segmented. Right mandible (Fig. 2E): pars incisiva with 4 teeth; lacinia mobilis with weakly 2-headed. Left mandible (Fig. 2E): pars incisiva with 4 teeth; lacinia mobilis with 2 teeth. Maxillula (Fig. 2G): endopod with 3 long plumose setae; exopod with 10 teeth on distal margin. Maxilla (Fig. 2H): endopod with 6 plumose setae; both lobes of exopod with 2 setae. Maxilliped (Fig. 2I): endite rectangular, with 3-4 plumose setae on distal margin and a coupling hook on lateral margin. Palp 4-segmented; segment 1 small without seta, segment 2 triangular, with 3-4 setae on inner margin; segment 3 rectangular, with 3 setae on inner margin and 2 setae on outer margin; terminal segment round, with 3-4 longer and about a dozen setae. Epipodite slender and elliptical.

Pereopod 1 (Fig. 3A) subchelate: basis 2.5 times as long as wide, with 1-3 long setae and much hair on inner margin and 3-4 setae and much hair on outer margin; ischium half the length of basis, with much hair on inner margin and two setae on inner distal area; merus 0.6 times of ischium, with much hair on inner margin and a seta on inner distal area; carpus a little shorter than merus, with a long seta at inner distal area and much hair on outer margin; propodus with 15-16 stout setae on inner margin, and 10-12 long and many short setae on outer area; dactylus a little longer than propodus, with 3 setae on distal area of inner margin.

Pereopod 2 (Fig. 3B): basis 3.6 times as long as wide, with 8 long setae and much hair on inner margin and 8-12 long setae on outer margin; ischium half the length, with 5-6 long setae on inner margin and 4 long setae on outer margin; merus half the length of ischium, with 3 setae on inner margin, and 4 long setae on outer margin and a stout seta at outer distal area; carpus short; propodus stout, with 2 stout setae and much hair on inner margin and 2-3 longer setae on distal area of outer margin; dactylus 0.6 times as long as propodus.

Pereopod 3 (Fig. 3C) similar to pereopod 2: basis 4.7 times as long as wide, with 9-10 long setae and much hair on inner margin and 7-8 long setae on basal half of outer margin; ischium 0.6 times as long as basis, with 9-10 long setae and many short setae on inner margin and 2 long setae and several shorter setae on outer margin; merus half the length of ischium and almost square in shape; carpus short and triangular; propodus stout, with 2 stout setae and much

hair on inner margin and 2-3 longer setae on distal area of outer margin; dactylus 0.6 times as long as propodus.

Pereopod 4 (Fig. 3D): basis 4.3 times as long as wide, with 4 long setae on both margins; ischium $\frac{2}{3}$ as long as basis, with 8 setae on inner margin and 3 very long setae and 10-12 shorter setae on outer margin; merus $\frac{1}{3}$ as long as ischium, with 8-13 setae on inner margin and 4 long setae on outer margin; carpus a little shorter than merus; propodus twice longer than carpus, with 3 long setae on outer margin.

Pereopod 5 (Fig. 3E): basis 4 times as long as wide, with 4-5 setae on inner margin and 2 setae on outer margin; ischium $\frac{2}{3}$ as long as basis, 12-13 setae on inner margin and 6 long setae on outer margin; merus half the length of ischium, with 6 setae on inner margin and 2 long setae on outer margin; carpus $\frac{2}{3}$ as long as merus, with 2-3 setae at inner distal area; propodus twice longer than carpus, with many short setae on inner margin and 5-setae on outer margin, and a long seta at pouter distal area.

Pereopod 6 (Fig. 3F): basis 4.2 times as long as wide, with 2-3 long setae on inner margin many short setae on

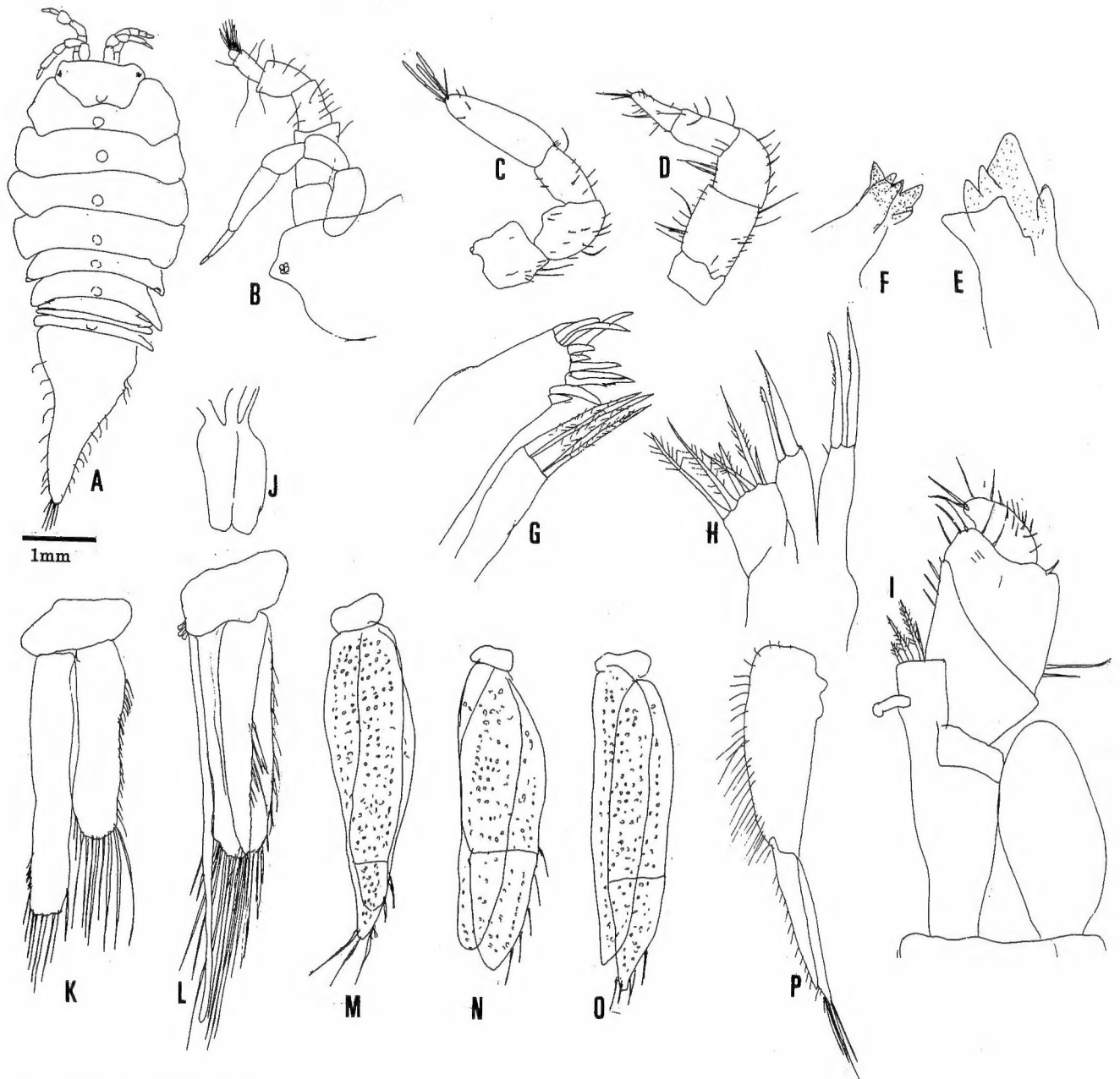


Fig.2 *Symmias azumai* n.sp.

A: Dorsal view; B: Cephalon and both antennae; C: Antennule; D: Antenna; E: Right mandible; F: Left mandible; G: Maxillula; H: Maxilla; I: Maxilliped; J: Penes; K-O: Pleopods 1-5; P: Uropod. (All: holotype male).

distal half of outer margin; ischium $2/3$ as long as basis, 5-6 setae on inner margin and 5 long setae on outer margin; merus 55% as long as ischium, with 4 setae on outer margin; carpus half the length of merus, with 4 setae on inner margin; propodus twice longer than carpus.

Pereopod 7 (Fig. 3G) $3/4$ as long as pereopod 6: basis 3.1 times as long as wide, with 2 setae on inner margin and 3 setae on outer margin; ischium 0.55 times as long as basis, with many short setae on inner margin and 2 setae on outer margin; merus 0.7 times as long as ischium, with 4 long setae at distal angle of outer margin; carpus half the length of merus, with 6 setae on inner margin; propodus twice longer than carpus, with a seta at outer distal angle; dactylus small.

Penes (Fig. 2J) rectangular, with a small concavity at medial area of the distal margin.

Pleopod 1 (Fig. 2K) both rami rectangular.

Pleopod 2 (Fig. 2L): basis rectangular, with 3 coupling hooks; endopod rectangular, with about a dozen long setae on distal margin; stylus long, exceeding far beyond endopod.

Pleopod 3 (Fig. 2M) and pleopod 4 (Fig. 2N): basis small; both rami long.

Pleopod 5 (Fig. 2N): endopod rectangular, with a protruded distal end.

Uropod (Fig. 2O): basis rectangular, with many setae on outer margin.

Female differs from male in the sexual characters.

Etymology: "Shijiki" is the name of the bay where the type series was collected.

Remarks: The present new species is most closely allied to *Symmius caudatus* recorded in Japan (Richardson, 1909), but the former is separated from the latter in the following features: (1) presence of round protuberance on dorsal surface, (2) longer dactylus of pereopod 1, (3) less protruded palpal segments of maxilliped, (4) shorter pleotelson, (5) reduction of dactylus on pereopod 7 and (6) less numerous segments of antenna.

The present new species is also allied to another Japanese species, *Symmius planus* recorded from Sanriku, northern Japan (Nunomura, 1984), but the former is separate from the latter in the following features: (1) less protruded poste-

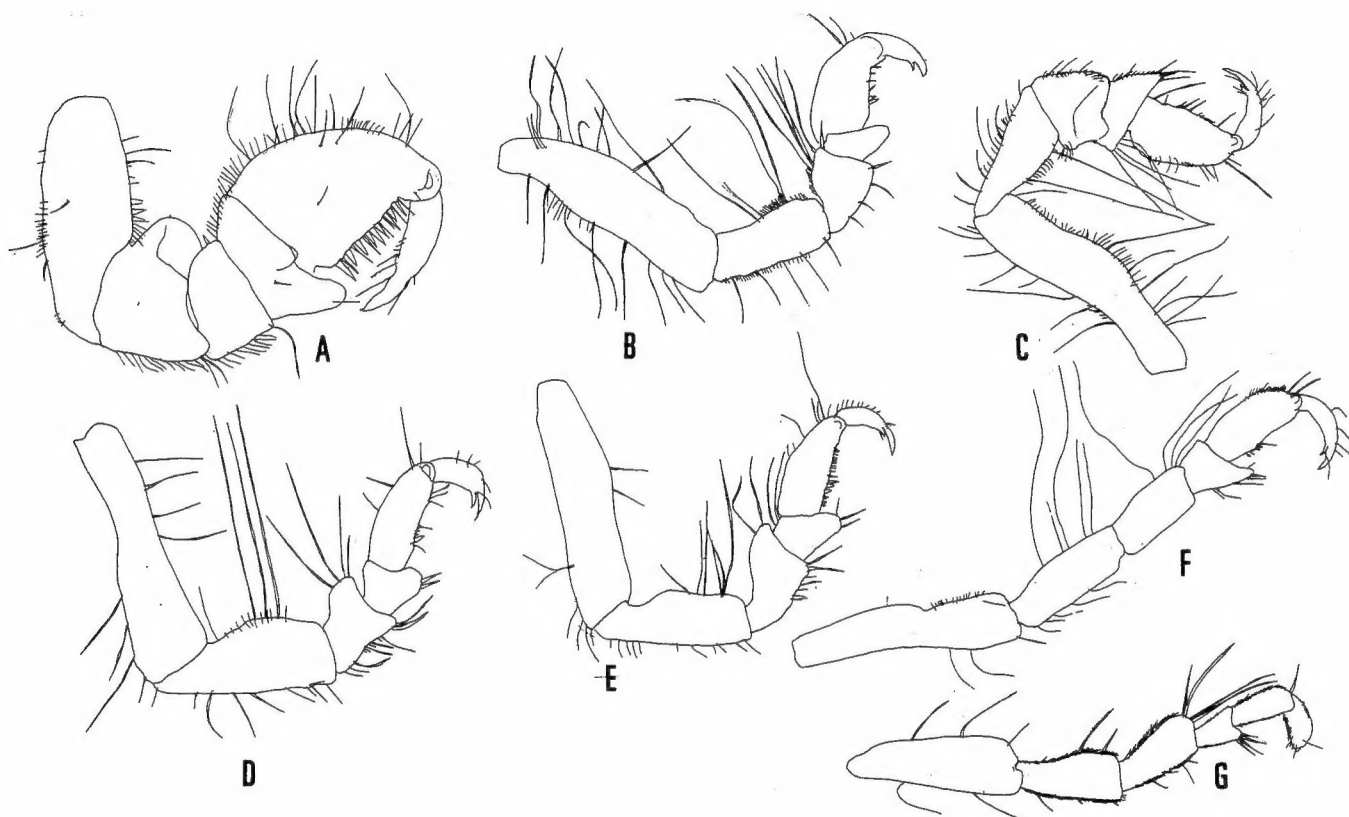


Fig.3 *Symmius azumai* n.sp.

A-G: Pereopods 1-7 (All: holotype male).

rior margin of pleotelson, (2) shape of the terminal segment of antennule, (3) presence of round protuberance on dorsal surface, (4) shorter stylus of male second pleopod, (5) less numerous setae on pereopods, (6) reduction of dactylus on pereopod 7 and (7) longer pleopods.

Family Arcturidae

Neastacilla longipectus n. sp. [J. n.: Munenaga-himenanafushi, new]

(Figs. 4-5)

Material examined: 1♂ (holotype, 9.9 mm in body length), Shijiki Bay, Off Shijiki-machi, (St. 21), sandy bottom 25m depth, May 11, 1984, coll. Mikio Azuma; 3♀♀ (1♀ allotype, 8.5 mm in body length and 2♀♀ paratypes, 5.5-7.5 mm in body length), Shijiki Bay (Mt. 5), May 12, 1977, coll. Mikio Azuma; 8♂♂ (paratypes, 4.4-7.5 mm in body length) and 2♀♀ (paratypes, 5.0-5.5 mm in body length), Shijiki Bay (Mt. 10), June 12, 1977, coll. Mikio Azuma; 5♂♂ (paratypes, 4.5-5.9 mm in body length) and 1♀ (9.6 mm in body length), Shijiki Bay (St. 9), 27m depth, sand, May 10, 1984, coll. Mikio Azuma; 5♂♂ (paratypes, 3.1-5.2 mm in body length) and 2♀♀ (paratypes, 6.0-6.6 mm in body length), Mouth of Shijiki Bay (St. 2), 44m depth, gravity sand, May 10, 1984, coll. Mikio Azuma. 1♂ (paratype, 7.0 mm in body length) and 2♀♀ (paratypes, 8.5-9.8 mm in body length), Shijiki Bay (St. 4), May 10 1984, coll. Mikio Azuma. Type series is deposited as follows: holotype (TOYA Cr-13641), allotype (TOYA Cr-13642) and 10 paratypes (TOYA Cr-13643~13652) at Toyama Science Museum; 6 paratypes (OMNH Ar-7610) at Osaka Museum of Natural History and 7 paratypes (NSMT Cr-17980) at National Museum of Nature and Science, Tokyo; 3 paratypes (KMNH IVR 500, 231-500, 233) at Kitakyushu Museum of Natural History and Human History. Other specimens: 1♀ Shijiki Bay (Mt. 11), June 12, 1977, coll. Mikio Azuma; 3♂♂3♀♀, Shijiki Bay (Mt. 5), June 12, 1977, coll. Mikio Azuma; 1♂, Tanoura, Apr. 12, 1983, coll. Mikio Azuma; 4♀♀, of Shijiki Bay (St. 3), 35m depth, sand, May 10, 1984, coll. Mikio Azuma; 2♂♂4♀♀, mouth of Shijiki Bay (St. 4), 31m depth, sand, May 10, 1984, coll. Mikio Azuma; 1♂1♀, mouth of Shijiki Bay (St. 5), 33m depth, sand, May 10, 1984, coll. Mikio Azuma; 1♂2♀♀, mouth of Shijiki Bay (St. 6), 31m depth, sand, May 10, 1984, coll. Mikio Azuma; 2♂♂, mouth of Shijiki Bay (St. 8), 16m depth, sand, May 10, 1984, coll. Mikio Azuma; 1♀, off Nagatenohama (St. 11), 31m depth, sand, May 10, 1984, coll. Mikio Azuma; 1 young, near Nokozaki (St. 17), 31m depth, sand, May 11, 1984, coll. Mikio Azuma; 2♂♂2 youngs, central part of Shijiki Bay (St. 22), 25m depth, May 11, 1984, coll. Mikio Azuma; 4 youngs, central part of Shijiki Bay (St. 23), 23m depth, May 11, 1984, coll. Mikio Azuma; 2♂♂, central part of Shijiki Bay (St. 24), 18m depth, sand, May 11, 1984, coll. Mikio Azuma; 1♂2♀♀1y, central part of Shijiki Bay (St. 27), 17m depth, sand May 28, 1984, coll. Mikio Azuma; 1♂1y, near Nokozaki (St. 31), 18m depth, sand, May 11, 1984, coll. Mikio Azuma; 1♀, Shijiki Bay (St. 32), 21m depth sand, May 12, 1984, coll. Mikio Azuma; 2♂♂, Shijiki Bay (St. 34), 16m depth, sand, May 12, 1984, coll. Mikio Azuma; 6 youngs, Shijiki Bay (St. 36), 18m depth, sand, May 12, 1984, coll. Mikio Azuma; 2♂♂, Shijiki Bay (St. 37), 38m depth, sand, May 12, 1984, coll. Mikio Azuma; 2♂♂, Shijiki Bay (St. 39), 5m depth and, May 12, 1984, coll. Mikio Azuma; 2♀♀1y, Shijiki Bay (St. 45), 26m depth, sand, May 12, 1984, coll. Mikio Azuma; 1♂1♀, near Tanoura (St. 48), 11m depth, sand, May 12, 1984, coll. Mikio Azuma; 1♀, Shijiki Bay (St. 51), 6m depth, sandy gravel, May 12, 1984, coll. Mikio Azuma.

Description of male: Body white in alcohol. Cephalosome (Fig. 3D) with an antero-medial process and a pair of anterolateral processes. Eyes relatively big and each eye with about 220 ommatidia. Pereonal somites 1 ~ 3 short. Pereonal somite 4 very long, occupying 45% of the whole body length. Pereonal somites 5-7 distinctly separated; pleon 1 a distinctly separated. Pleonal somites 2-5 and telson fused (Fig. 1F). Pleotelson with 2 pairs of processes on lateral margin.

Antennule (Fig. 4G) 4-segmented, mutual length is 4: 2: 3: 10; terminal segment with 16-17 aesthetascs on lateral margin. Antenna (Fig. 4H) long, peduncle 5-segmented and mutual length are 1: 6: 4: 6: 9; flagellum 2-segmented, with many short setae on inner margin.

Mandible (Fig. 4I and J): pars incisiva 3-toothed; lacinia mobilis 3-toothed; processus molaris wide. Maxillula (Fig. 4K): endopod with 3 plumose setae on distal margin; exopod with 10 setae on distal margin. Maxilla (Fig. 4L):

endopod with 12 plumose setae and several setae on inner margin; both lobes of exopod with 4 long setae. Maxilliped (Fig. 4M): endite wide and rounded, with a coupling hook on lateral margin and many setae on distal margin; palp five-segmented, segment 2 with 5-6 setae on inner margin, segment 3 long with 8-11 setae on inner margin; segment 4 with 5-6 setae on inner distal area and 2 long setae on outer margin; segment 5 square, with 7-8 long setae on distal margin; epipodite elliptical.

Pereopods 1-4 slender and pereopods 5-7 walking type. Pereopod 1 (Fig. 5A) slender and a little shorter than the pereopods 2-4: basis 5.0 times as long as wide, with 4-5 setae on inner distal area; ischium $1/4$ as long as basis; merus a little longer than ischium, with several shorter setae on basal half and 5-6 longer setae on distal half of inner margin, and 2 longer setae on outer distal angle; carpus 1.35 times longer than merus, with 20 setae on inner margin; propodus as long as carpus, with 14-15 setae on inner margin and 10-11 setae on outer margin and 2-3 long serrated setae on outer distal area; dactylus small and square, with 5-6 setae.

Pereopod 2 (Fig. 5B): basis 1.8 times as long as wide, ischium a little shorter than basis; merus 1.7 times longer than ischium, with 2 plumose setae on inner margin; carpus $3/4$ as long as merus; propodus 1.3 times longer than

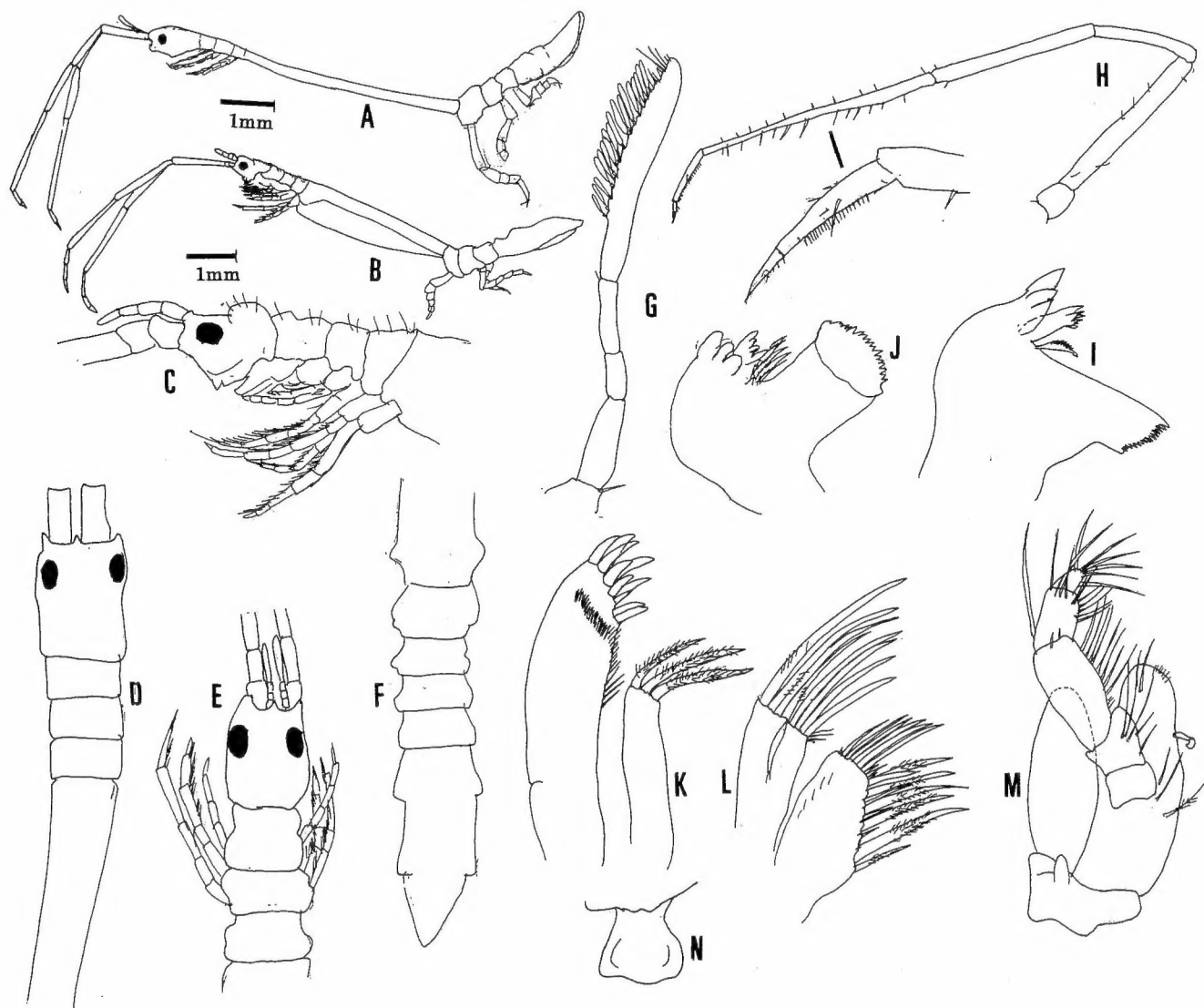


Fig.4 *Neastacilla longipectus* n.sp.

A: Lateral view of male; B: Lateral view of female; C: Anterior part of the same; D: Anterior part of cephalon in male; E: Anterior part of female; F: Posterior part of the male; G: Antennule; H: Antenna; I: Right mandible; J: Left mandible; K: Maxillula; L: Maxilla; M: Maxilliped; N: Penis (A, D, G-N: holotype male; B-C, E female paratype).

carpus; dactylus small and rectangular.

Pereopod 3 (Fig. 5C) a little longer than pereopod 2: basis 4.5 times as long as wide, with 3-4 setae on inner margin; ischium half the length of basis, with 2 setae on inner margin; merus almost 2.6 times longer than basis; carpus 0.85 times as long as merus; propodus $2/3$ as long as wide, with 5-6 relatively long setae.

Pereopod 4 (Fig. 5D) as long as pereopod 3: basis 4 times as long as wide; ischium rectangular, with 7-8 setae on inner margin; merus twice as long as ischium, with 4-6 long setae; carpus as long as merus, with 8-10 long setae on inner margin; propodus a little shorter than carpus with 5-6 setae at the tip.

Pereopod 5 (Fig. 5E) relatively long: basis 5 times as long as wide, with a seta on inner distal margin and a seta outer distal angle; ischium 0.35 times as long as basis; merus 0.6 times as long as ischium; carpus 1.3 times longer than merus; propodus 1.6 times longer than carpus; dactylus bifid.

Pereopod 6 (Fig. 5F) 0.65 times as long as pereopod 5: basis 3.2 times as long as wide, with 10-11 setae on inner margin and 8 setae on outer margin; ischium 45% as long as wide; merus $3/4$ as long as ischium; carpus 1.6 times longer than merus, with 3 setae on inner margin and 6 setae on outer margin; propodus 1.6 times longer than carpus,

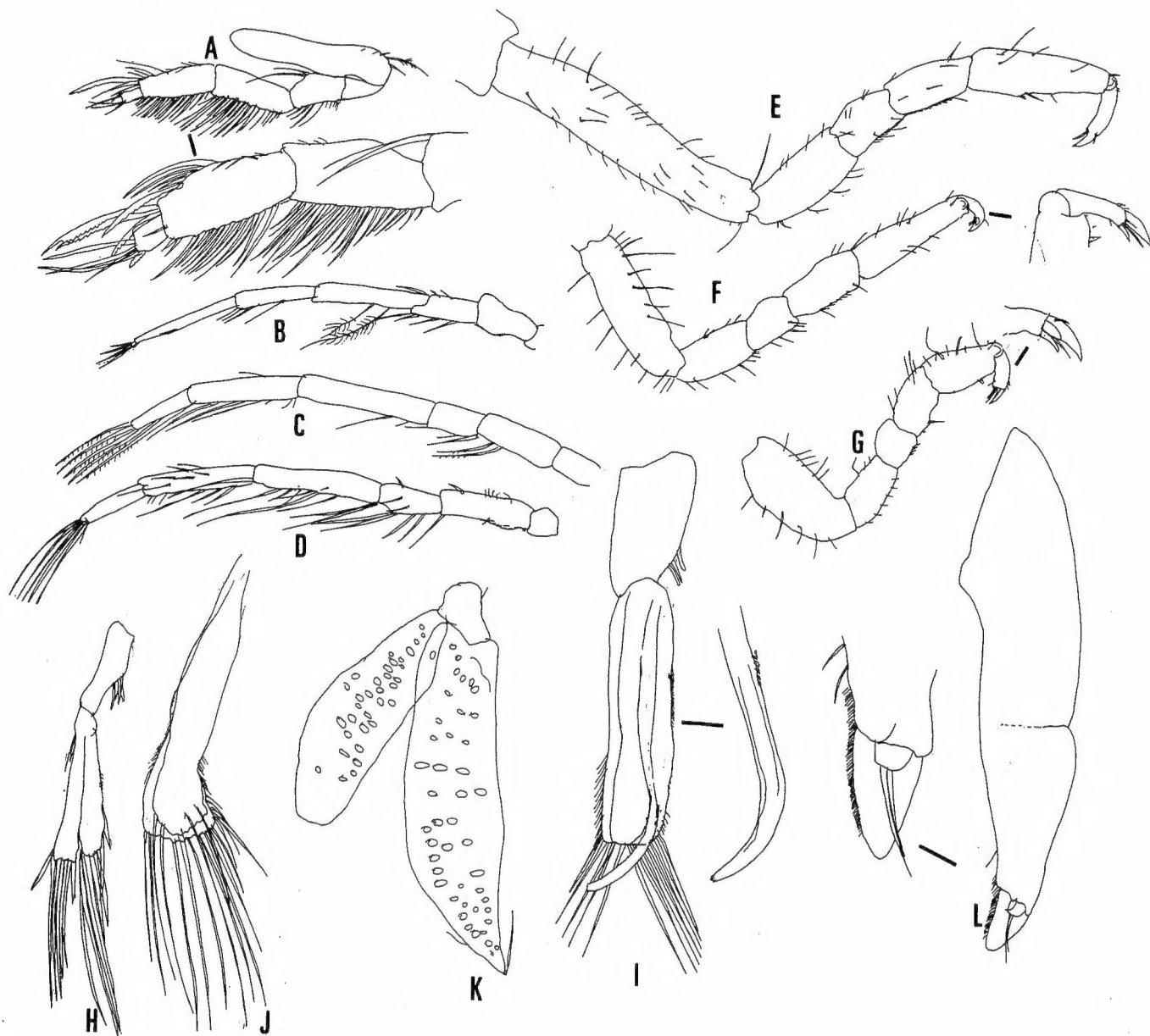


Fig.5 *Neastacilla longipectus* n.sp.

A-G: Pereopods 1-7; H-K: Pleopods 1-4; L: Uropod(All:holotype male).

with 3-4 setae on inner margin and 5-6 setae on outer margin; dactylus bifid.

Pereopod 7 (Fig. 5G) 0.7 times as long as pereopod 6; basis 2.2 times as long as wide; ischium half the length of basis; merus half the length of ischium; carpus 1.5 times longer than propodus; propodus 1.4 times longer than merus; dactylus bifid.

Penes (Fig. 4N) fused and rectangular.

Pleopod 1 (Fig. 5H): basis rectangular, with 4 coupling hooks on lateral margin; both rami rectangular, slightly broadening toward the tip, with 8-12 long setae on distal margin.

Pleopod 2 (Fig. 5I): basis with 4 coupling hooks on lateral margin; stylus exceeding far beyond the tip of endopod, apical part bent; endopod and exopod rectangular, with 5-8 long setae on distal margin.

Pleopod 3 (Fig. 5J): rectangular slightly broadening toward the tip, with 8-12 long setae on distal margin.

Pleopods 5 (Fig. 5K): both rami lanceolate; exopod with a swimming seta.

Uropod (Fig. 5L) narrow; secondary ramus with 2 long setae at the tip.

Etymology: "pectus" means breast in Latin. The male has long fourth pereopod somite.

Remarks: Hitherto, 38 species of the genus *Neastacilla* have been recorded (e.g. King, 2003, Kussakin, 1982). The present new species is most closely allied to *Neastacilla tanakai* reported from Izu (Nunomura, 2007). But the former is separated from the latter in the following features: (1) longer than body, (2) presence of lateral projection of pleotelson, (3) bigger eyes, (4) numerous setae on pereopods, (5) numerous teeth on maxilla and (6) longer stylus of male second pleopod.

***Arcturina plumbiformis* n. sp. [J. n.: Hatogata-himenanafushi, new]**

(Figs. 6-8)

Material examined: 7 ♀♀ (1 ♀ holotype, 4.7 mm in body length and 6 ♀♀ paratypes, 3.6-4.1 mm in body length) and 3 ♂♂ (1 ♂ allotype, 5.6 mm in body length and 4 ♂♂ paratypes 3.0-5.7 mm in body length 2 ♂♂ (paratypes, 4.4-5.9 mm in body length) and 5 ♀♀ (paratypes, 4.5-5.6 mm in body length), Shijiki Bay (St. 33), 22 m depth, sand, May 11, 1984, coll. Mikio Azuma, 2 ♂♂ (paratypes, 5.4-5.6 mm in body length) and 1 ♀ (paratype, 4.0 mm in body length), Shijiki Bay (St. 32), 21 m depth, sand, May 11, 1984, coll. Mikio Azuma. Type series is deposited as follows: holotype (TOYA Cr-13653), allotype (TOYA Cr-13654) and 6 paratypes (TOYA Cr-13653~13660, 13686~13687) at Toyama Science Museum. 10 paratypes (OMNH Ar-7616) at Osaka Museum of Natural History and 8 paratypes (NSMT Cr-17981) at National Museum of Nature and Science, Tokyo and 3 paratypes (KMNH IVR-500, 234-500, 236) at Kitakyushu Museum of Natural History and Human History. Other specimens: 13 ♀♀, Shijiki Bay, near Noko (Mt. 10), June 12, 1977, coll. Mikio Azuma; 8 ♀♀, Shijiki Bay, near Noko (Mt. 5), June 12, 1977, coll. Mikio Azuma; 1 ♀, Shijiki Bay (St. 5), 33m depth, sand, May, 10, 1984, coll. Mikio Azuma; 1 ♂ 4 ♀♀, Shijiki Bay (St. 7), 22m depth, sand, May 10, 1984, coll. Mikio Azuma; 1 ♂ 3 ♀♀, Shijiki Bay (St. 10), 31m depth, sand, May 10, 1984, coll. Mikio Azuma; 3 ♀♀, Shijiki Bay (St. 16), 28m depth, sand, May 11, 1984, coll. Mikio Azuma; 1 ♀, Shijiki Bay (St. 18), 24m depth, sand, May 11, 1984, coll. Mikio Azuma; 4 ♂♂, Shijiki Bay (St. 22), 25m depth, sand, May 11, 1984, coll. Mikio Azuma; 2 ♀♀, Shijiki Bay (St. 23), 23m depth, sand, May 11, 1984, coll. Mikio Azuma; 2 ♀♀, Shijiki Bay (St. 25), 23m depth, sand, May 11, 1984, coll. Mikio Azuma; 1 ♂ 2 ♀♀, Shijiki Bay (St. 26), 21m depth, sand, May 11, 1984, coll. Mikio Azuma; 1 young, Shijiki Bay (St. 35), 8m depth, sand, May 12, 1984, coll. Mikio Azuma; 2 ♀♀, Shijiki Bay (St. 37), 8m depth, sand, May 12, 1984, coll. Mikio Azuma.

Description of female: Body white in alcohol. Body 2.9 times as long as wide. Cephalon with a medial process anteriorly and a pair of antero-lateral projections. Eyes relatively big and each eye with about 45 ommatidia. Pereopod somites 1-3 partly fused and broadening toward the posterior end. Pereopod somite 4 expanding and forming a rhombus. Pereopod somite 5 narrow, with a pair of spines. Pereopod somites 6-7 slender. Pleotelson with an acute posterior margin. Pleopod somites fused with telson. Pleotelson with an acute posterior end.

Antennule (Fig. 6 D) 4-segmented; mutual length of 4 segments is 1: 1: 1: 2. Flagellum with 12-13 aesthetascs on lateral margin. Antenna (Fig. 6 E) long: peduncular segments 1-3; segment 4 long with a seta on lateral margin

flagellum 3-segmented. Mandible (Fig. 6F and G): pars incisiva 3-toothed; lacinia mobilis 3-toothed; processus molaris wide. Maxillula (Fig. 6H): endopod with 3 plumose setae on distal margin; exopod 10 relatively short simple setae on distal margin. Maxilla (Fig. 6I): endopod with 12 plumose setae on inner margin; both lobes of exopod with long setae. Maxilliped (Fig. 6J) endite round, with a coupling hook on inner margin; palp five-segmented and segment 3 largest; epipodite lanceolate.

Pereopod 1 (Fig. 7A): basis twice as long as wide, with a seta at inner distal angle; ischium half the length of basis, with a seta at inner distal angle; merus short, half the length of ischium, with a seta at inner distal angle; carpus 1.2 times longer than ischium, with 9 setae at inner margin; propodus as long as carpus; dactylus small.

Pereopod 2 (Fig. 7B): basis wide; ischium rectangular, with 4 setae on inner margin; merus half the length of ischium, with 2 setae on inner margin; carpus twice longer than merus; propodus 1.5 times longer than carpus; dactylus rudimentary.

Pereopod 3 (Fig. 7C): basis big; ischium, merus and carpus square in sharp and subequal in length; propodus a little longer than carpus; dactylus a little shorter than propodus with a seta.

Pereopod 4 (Fig. 7D): basis big, 1.7 times longer than that of pereopod 2; ischium, merus and carpus square in sharp and subequal in length; propodus 1.5 times longer than carpus; dactylus small.

Pereopod 5 (Fig. 7E) longest: basis rectangular; ischium $2/3$ as long as basis; merus $3/4$ as long as ischium; carpus 1.6 times as long as merus; carpus 1.4 times as long as wide; propodus 1.7 times longer than carpus; dactylus with a claw.

Pereopod 6 (Fig. 7F) shorter than pereopod 5: basis 3.0 times as long as wide; ischium $3/4$ as long as basis; merus

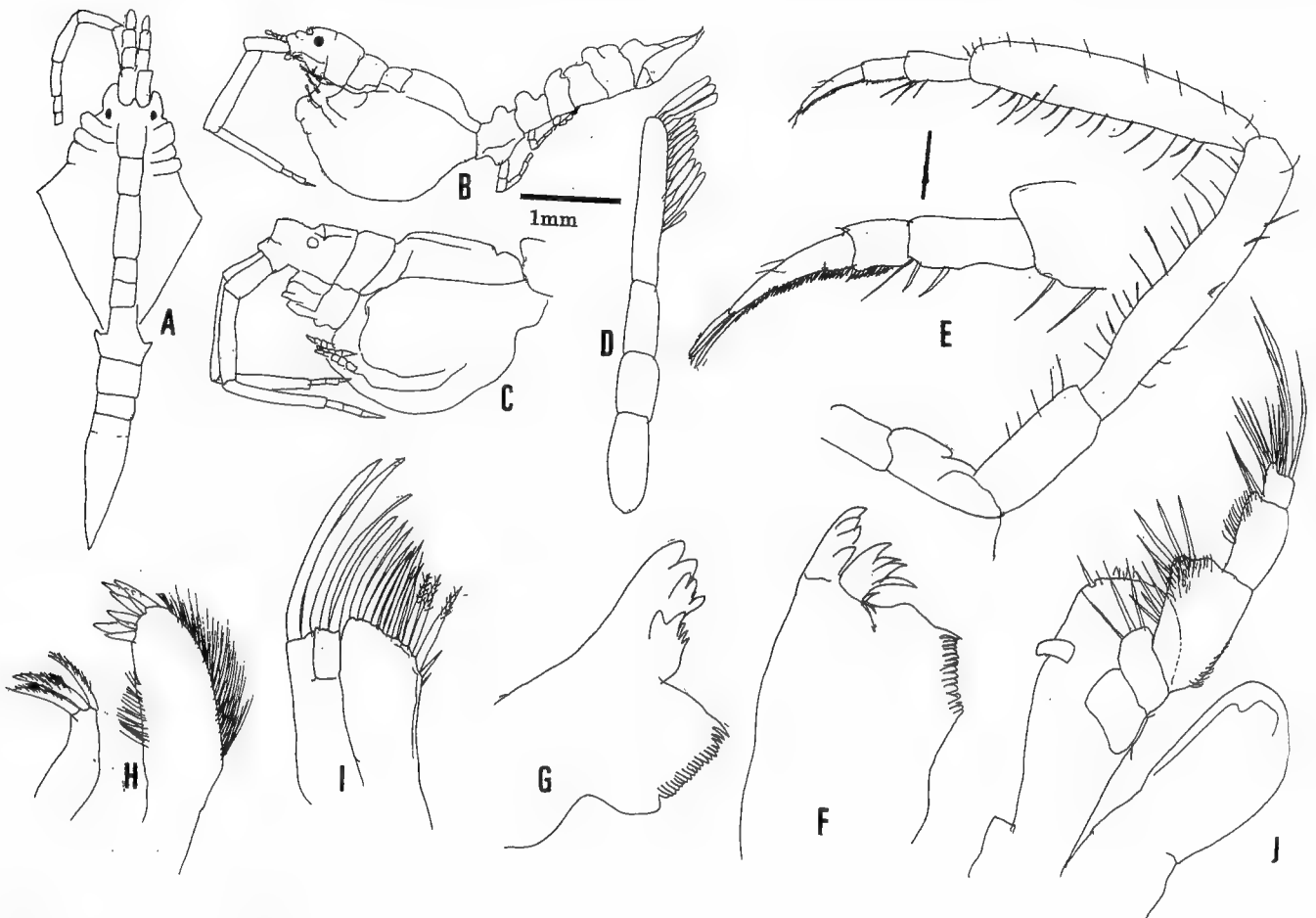


Fig.6 *Arcturina plumbiformis* n.sp.

A: Dorsal view of female; B: Lateral view of female; C: Anterior part of the same; D: Antennule; E: Antenna; F: Right mandible; G: Left mandible; H: Maxillula; I: Maxilla; J: Maxilliped (All: holotype female).

as long as ischium; carpus 1.5 times longer than merus; propodus 1.2 times longer than carpus; dactylus with a claw.

Pereopod 7 (Fig. 7G) a little shorter than pereopod: basis rectangular, twice as long as wide; ischium 1.2 times longer than basis; merus $\frac{3}{4}$ as long as wide; carpus as long as ischium; propodus 1.3 times longer than carpus; dactylus with a claw.

Pleopod 1 (Fig. 7H): basis rectangular, 6 times as wide, with 4 coupling hooks on lateral margin; endopod and exopod rectangular.

Pleopod 2 (Fig. 7I): basis 4.8 times as long as wide; both rami with 6-8 setae on distal margin.

Pleopod 3 (Fig. 7J): basis 3 times as long as wide; both rami 1.5 times longer than basis.

Pleopod 4 (Fig. 7K): basis short; both rami lanceolate, with a swimming seta.

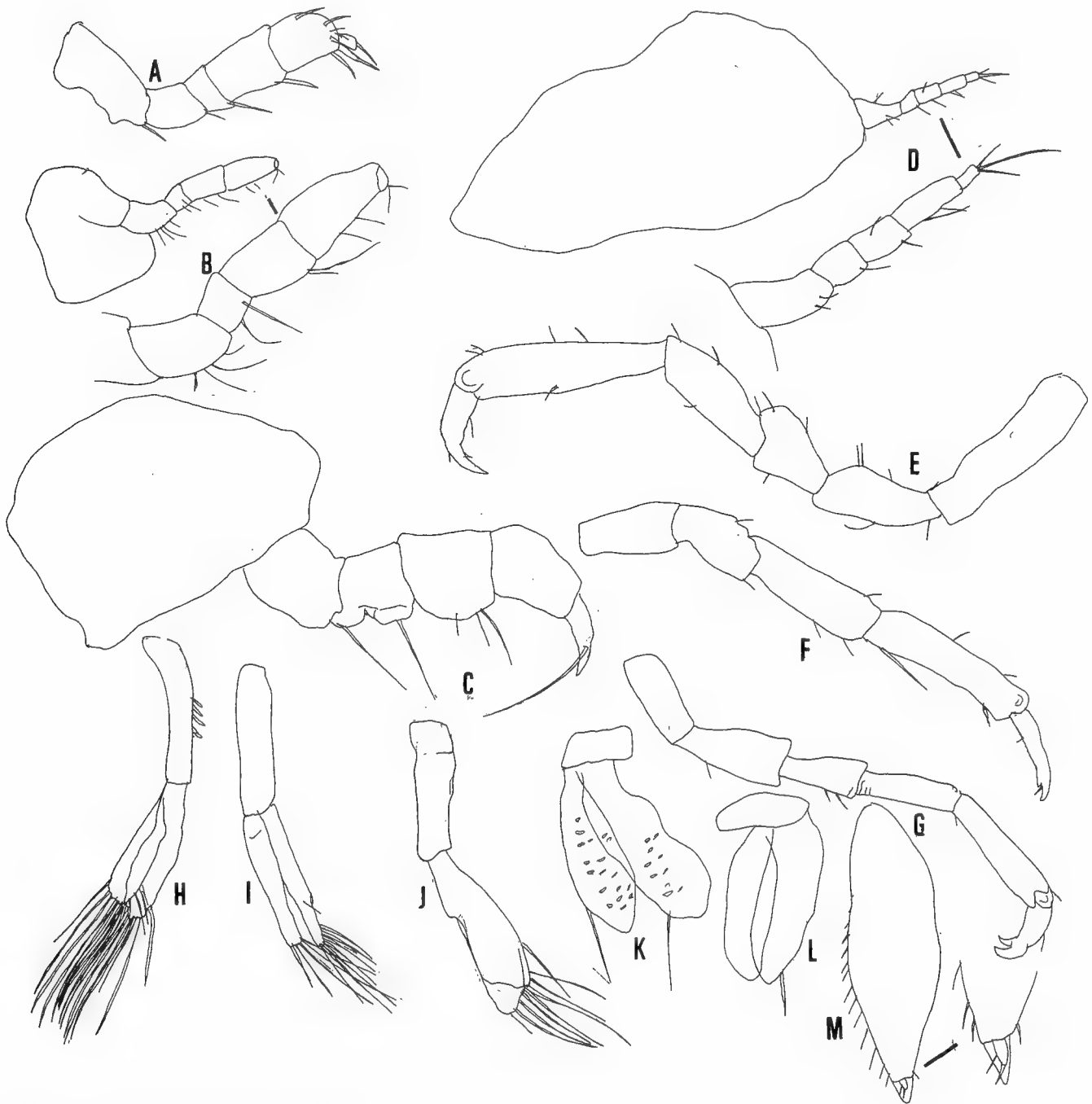


Fig.7 *Arcturina plumbiformnis* n.sp.

A-G: Pereopods 1-7; H-L: Pleopods 1-5; M: Uropod (All: holotype female).

Pleopod 5 (Fig. 7L): basis short; endopod lanceolate, with a swimming seta; exopod lanceolate.

Uropod (Fig. 7M) lanceolate: secondary ramus small, with 2 setae.

Description of male: Body slenderer than female. Pereonal somite 4 not so protruded as female.

Pereopod 1 (Fig. 8B): basis rather short; ischium almost square, with 2 setae on inner margin; merus short with 2 setae, carpus; propodus as long as carpus, with 2 setae on inner margin and 7-8 setae on distal margin; dactylus slender.

Pereopods 2-4 similar to those of female, but without big coxae. Pereopod 2 (Fig. 8C): basis square, ischium subequal; merus a little longer than ischium; carpus rectangular; propodus a little longer than carpus, with a sinuate lateral margin; dactylus very small.

Pereopod 3 (Fig. 8D): basis, ischium and merus square in sharp and subequal in length; carpus 1.5 times longer than merus; propodus rectangular, and tapering towards the tip; dactylus small, with 3 setae at the tip.

Pereopod 4 (Fig. 8E): basis twice as long as wide; ischium, merus square carpus and indistinct; propodus square, their boundary often dactylus small, with 4 setae.

Pereopods 5-7 similar to those of female. Pereopod 5 (Fig. 8F): basis rectangular, 4 times as long as wide; ischium 0.8 times as long as basis; merus 0.7 times as long as ischium; carpus as long as merus; propodus 1.7 times longer than carpus; dactylus with a claw.

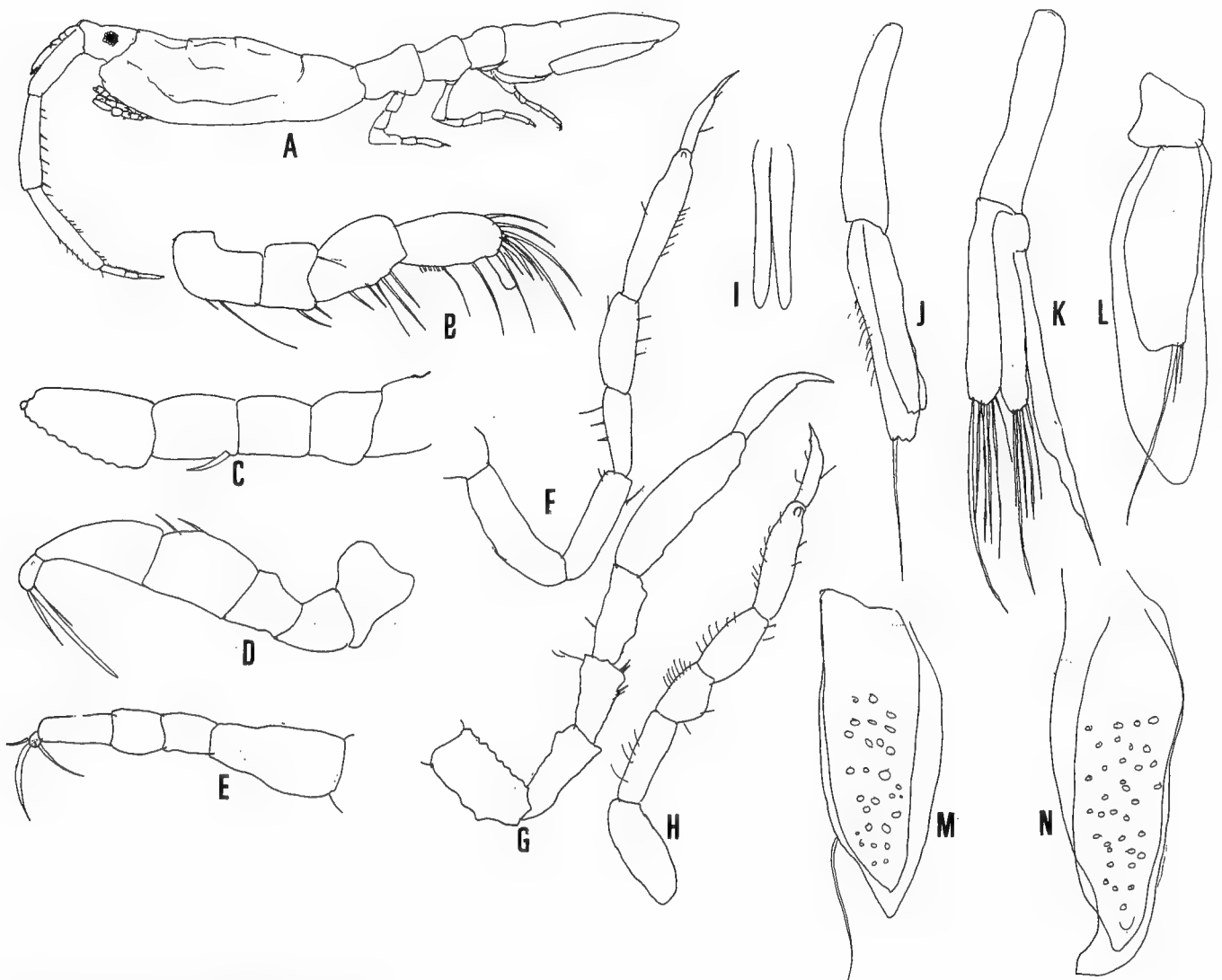


Fig.8 *Arcturina plumbiformis* n.sp.

A: Lateral view of male; B-H: Pereopods 1-7; I: Penes; J-M: Pleopods 1-5 (Allotype male).

Pereopod 6 (Fig. 8G): a little shorter than pereopod 5: basis twice as long as wide, with sinuate both margins; ischium a little shorter than basis; merus a little shorter than basis; carpus 1.4 times longer than merus; propodus twice longer than carpus; dactylus 0.6 times as long as carpus.

Pereopod 7 (Fig. 8H) a little shorter than pereopod: basis rectangular, 4 times as long as wide; ischium 1.2 times longer than basis; merus 0.6 times as long as wide carpus 1.4 times longer than merus; propodus 1.5 times longer than carpus; dactylus with a claw.

Penes (Fig. 8I) paired and each penis 10-12 times as long as wide.

Pleopod 1 (Fig. 8J): basis rectangular, 6 times as long as wide; both rami lanceolate.

Pleopod 2 (Fig. 8K): both rami rectangular, with 5-6 long setae on distal margin; stylus long, extending beyond the tip of endopod.

Pleopod 3 (Fig. 8L): basis almost square; both rami lanceolate.

Pleopod 4 (Fig. 8M): basis rectangular, both rami lanceolate; exopod with a swimming seta.

Pleopod 5 (Fig. 8N): both rami lanceolate.

Etymology: "*plumbus*" means "pigeon" in Latin. The female of this species reminds a pigeon bearing an expanded chest.

Remarks: Hitherto, five species of the genus *Arcturina*, but four of these are from Africa (e.g. Barnard 1925, 1957 Kensley 1975) and another one from India (Pillai, 1963). The present new species is the first record in Japan and western Pacific. This species is most closely allied to *A. sutula* Kensley 1975, recorded from South Africa. But the former is separated from the latter in the following features: (1) longer pleotelson, (2) presence of lateral projection, (3) presence of distinct suture lines of pereonal somites 1-5 in dorsal view and (4) weaker anterolateral projections of cephalon.

The present new species is also allied to *A. rhomboidalis*, Kohler, 1911 reported from West Africa, but differs from *rhomboidalis* in the following features: (1) longer pleotelson, (2) presence of lateral projection, (3) distinct suture lines of pereonal somites 1-5 in dorsal view, (4) wider coxae of pereopods in female 2-4, (5) smaller eyes and (6) numerous aesthetascs on antennule.

Suborder Cymothoidea

Family Cirolanidae

***Cirolana harfordi japonica* Thielemann, 1910 [J. n.: Nise-sunahorimushi]**

Material examined: 4 youngs, Shijiki-machi, intertidal, June 6, 1994, coll. Noboru Nunomura; 8 ♀♀, Shijiki-machi intertidal, June 7, 1994, coll. Noboru Nunomura; 1 ♂ 4 ♀♀ 2 youngs, Oda, Aug. 28, 2007, coll. Noboru Nunomura; 6 youngs: 2 youngs, Ooshijiki-machi, Aug. 27, 2007, coll. Noboru Nunomura; 1 ♀, mouth of Shijiki Bay (St. 1), 41m depth, sandy gravel, coll. Mikio Azuma.

***Natatolana albicauda* (Nunomura, 1985) [J. n.: Ojiro-sunahorimushi]**

Material examined: 1 ♀, Shijiki Bay (St. 26), 21m depth, sand, May 11, 1984, coll. Mikio Azuma.

***Eurydice nipponica* Bruce & Jones, 1981 [J. n.: Nagisa-sunahorimushi]**

Material examined: 1 ♀, Shijiki Bay (St. 9), 27m depth, sand, May 10, 1984, coll. Mikio Azuma; 1 ♀, Shijiki Bay (St. 13), 35m depth, sand, May 1984, coll. Mikio Azuma; 1 ♀, Shijiki Bay, (St. 14), 32m depth, sand, May 10 1984, coll. Mikio Azuma; 2 ♀♀, Shijiki Bay (St. 15), 31m depth, sand, May 11, 1984, coll. Mikio Azuma; 1 ♀, Shijiki Bay (St. 17), 26m depth, sand, May 11, 1984, coll. Mikio Azuma; 4 ♀♀, Shijiki Bay (St. 18) 24m depth, sand, May 11 1984, coll. Mikio Azuma; 1 ♀, Shijiki Bay, (St. 21), 25m depth, sand, May 10, 1984, coll. Mikio Azuma; 4 ♀♀, Shijiki Bay (St. 26), 21m depth, sand, May 11, 1984, coll. Mikio Azuma; 1 ♀, Shijiki Bay (St. 27), 17m depth, sand, May 11, 1984, coll. Mikio Azuma.

Eurydice saikaiensis, n. sp. [J. n.: Saikai-nagisa-sunahorimushi, new]

(Fig. 9-10.)

Material examined: 5♂♂ (1♂ holotype, 6.6 mm in body length and 4♂♂ paratypes, 3.5-4.8 mm in body length) and 4♀♀ (1♀ allotype, 5.8 mm in body length and 3♀♀ paratypes, 2.6-4.0 mm in body length), Mouth of Shijiki Bay (St. 3), May 10 1984, coll. Mikio Azuma. Type series is deposited as follows: holotype (TOYA Cr-13672), allotype (TOYA Cr-13673) and a paratypes (TOYA Cr-13674) at Toyama Science Museum. Other specimens: 1♀, Shijiki Bay, (St. 2) 44 m depth, gravely sand, May 10 1984, coll. Mikio Azuma; 1♂, Shijiki Bay (St. 3), 35 m depth, sand, May 10, 1984, coll. Mikio Azuma; 1♀, Shijiki Bay (St. 5), 33m depth, sand, May 10, 1984, coll. Mikio Azuma; 1♀, Shijiki Bay, (St. 5), 33m depth, sand, coll. Mikio Azuma; 1♀, Shijiki Bay, (St. 6), 31m depth, sand, May 10 1984, coll. Mikio Azuma; 1♂3♀, Shijiki Bay, (St. 7), 22m depth, sand, May 10, 1984, coll. Mikio Azuma.

Description of male: Body 3.1 times as long as wide. Color reddish in alcohol. Eyes big, each eye composed of 27-30 ommatidia. Anterior margin of cephalon with minute rostral process. Pleotelson shorter than wide, lateral margin feebly convex. Posterior margin truncate, half the length of greatest width, provided with 5-6 dentations and 8 plumose setae.

Antennule (Fig. 9D) rather short; segment 1 stout; segment 3 with much fine hair on inner margin. Terminal segment long without setae. Antenna (Fig. 9F) long, reaching the posterior half of pleotelson, composed of 39-40 segments. Mandible (Fig. 9G): pars incisiva 4-toothed; processus molaris wide. Maxillula (Fig. 9H): inner lobe with 3 plumose setae; outer lobe with 10 teeth on distal margin. Maxilla (Fig. 9I): endopod wide, with 6 setae; inner lobe of endopod with 3 setae, outer lobe of the same with 3 setae. Maxilliped (Fig. 9J): endite relatively small, palp composed of 5-segments.

Pereopods 1-3 shorter the posterior 4 pairs. Pereopod 1 (Fig. 10A): basis 3 times as long as wide; ischium half the length of basis, with 4 setae on inner margin; merus almost square, with 3 setae at outer distal angle; carpus short

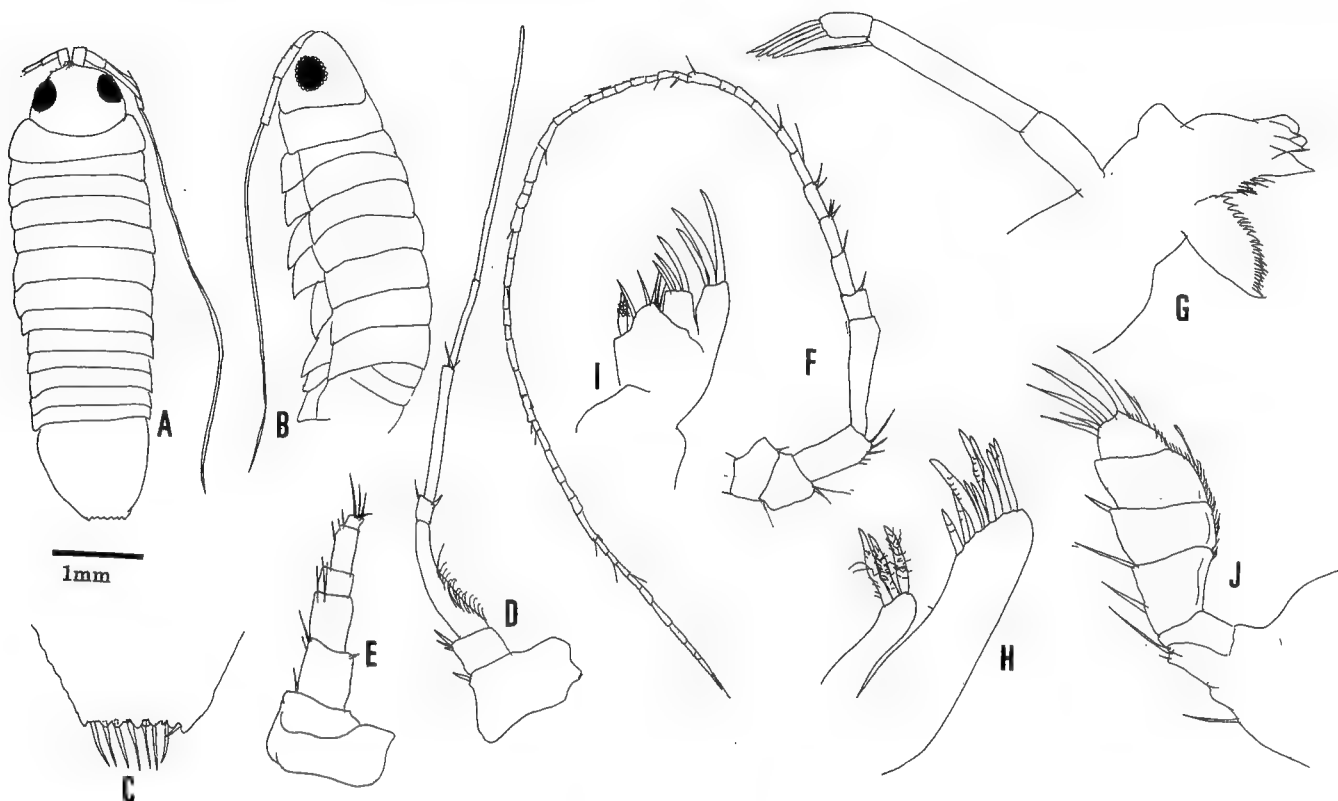


Fig.9 *Eurydice saikaiensis*, n.sp.

A: Dorsal view; B: Lateral view; C: Posterior end of pleotelson; D: Antennule of male; E: Antennule of female; F: Antenna; G: Mandible; H: Maxillula; I: Maxilla; J: Maxilliped (All: holotype male).

and triangular, with 2-3 setae on inner margin; propodus with 6 setae on inner margin, dactylus half the length of propodus.

Pereopod 2 (Fig. 10B): basis 3 times as long as wide, with 2 setae at inner distal angle; ischium with 2 short setae on inner margin; merus short, with 14-15 setae on distal margin; carpus triangular; propodus with 10 setae on inner margin; dactylus half the length of propodus.

Pereopod 3 (Fig. 10C): basis 3 times as long as wide, with 5 setae at inner distal area; ischium 0.4 times as long as basis, with 4-6 setae on inner margin, merus a little shorter than merus, with 2-3 setae on inner margin, 4-5 setae at inner distal area and 1-2 setae at outer distal angle; carpus 0.7 times as long as merus, with 2 setae at inner distal angle; propodus 2.5 times longer than carpus.

Pereopod 4 (Fig. 10D) slightly longer than the preceding ones: basis 3 times as long as wide, with 5 setae at inner distal area; ischium 2/3 as long as basis, with sinuate inner margin and with 2 groups of 5-6 setae on inner margin; merus square, with 6 setae on inner distal area and 4-5 setae on outer distal area; carpus square, with 2 setae on inner

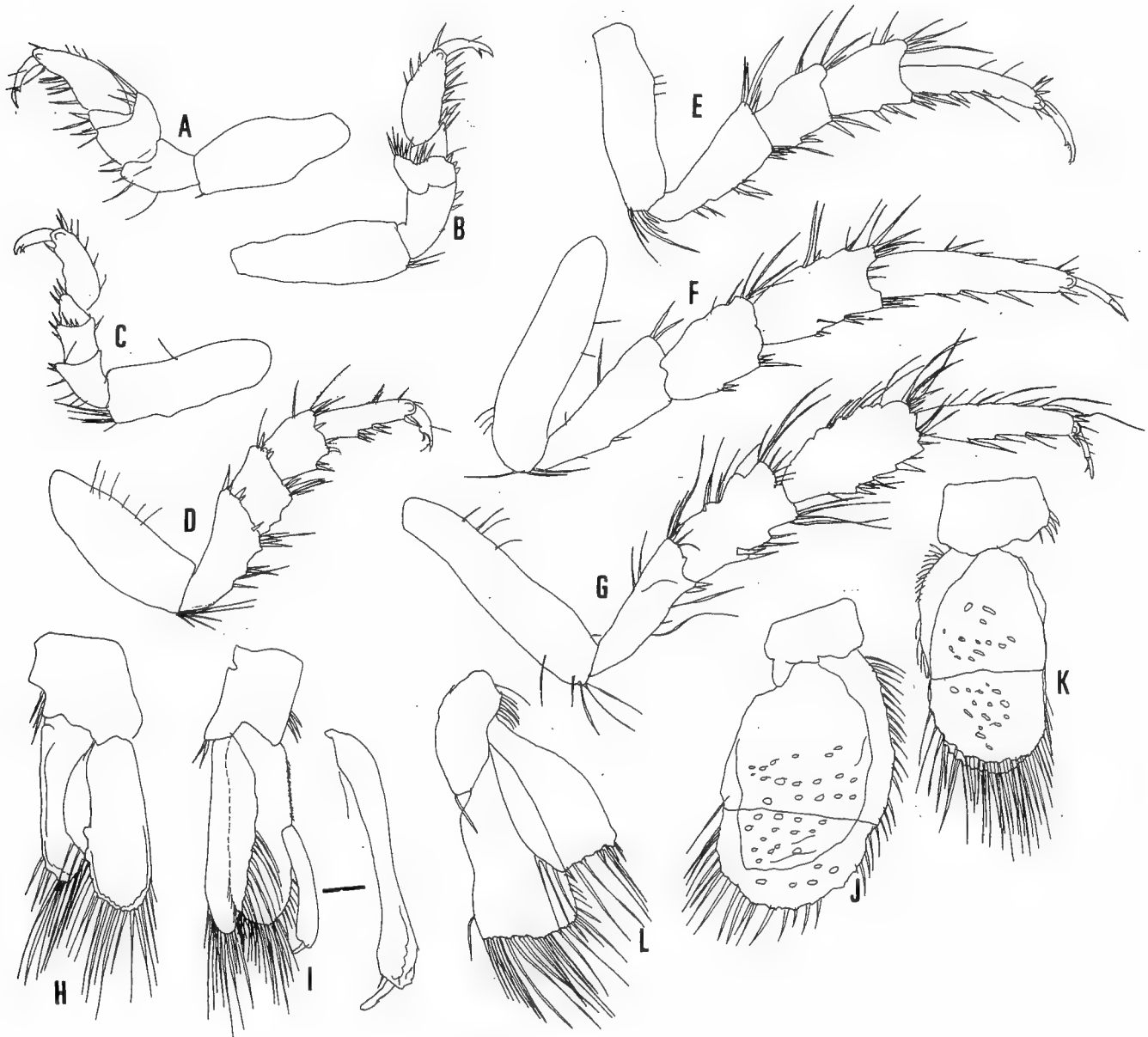


Fig.10 *Eurydice saikaiensis* n.sp.

A-G: Pereopods 1-7; H-I: Pleopods 1-2; J-K: Pleopods 4-5; L: Uropod (All: holotype male).

margin and 7-8 setae on distal margin; propodus with 3 groups of 1-3 setae on inner margin.

Pereopod 5 (Fig. 10E) a little longer than the pereopod 4: basis with 5 long setae at inner distal area; ischium with 2 groups of 2-3 setae on inner margin, 4-5 long setae at inner distal area and outer distal area; merus almost square, with 6 setae on inner margin and 4-5 setae on outer margin; carpus a little longer than merus, with 7-8 setae on both margins of distal area; propodus with 6 setae on inner margin and 5-6 setae on outer margin.

Pereopod 6 (Fig. 10F): a little longer than the pereopod 5: basis 4.5 times as long as wide, with 3 setae at inner distal area; ischium 3/4 as long as basis, with 2 setae at outer distal angle; merus a little longer than wide, with 2 groups of 2-3 setae on inner margin and 6-7 setae on outer margin; carpus a longer than merus, both margins sinuate, with 5-6 long setae on outer margin; propodus with 4-5 setae on inner margin.

Pereopod 7 (Fig. 10G): basis 5 times as long as wide; ischium times as long as basis, with 3 setae on both margins, 2 setae at inner distal area and 4-6 setae at outer distal area; merus, with both sinuate margins; carpus with sinuate both margins; propodus with inner sinuate margin, and with 4 setae, 2 stouter setae and 5-6 longer setae on outer margin.

Pleopod 1 (Fig. 10H): both rami ellipsoid.

Pleopod 2 (Fig. 10I): basis square, with 3 setae on inner margin and 2 setae at outer basal angle; endopod lanceolate, with setae around the margin; stylus arising the middle part of endopod, with a narrow apical part.

Pleopod 4 (Fig. 10J): basis rectangular; endopod broad lanceolate, exopod lanceolate, but narrower and shorter than endopod.

Pleopod 5 (Fig. 10K): both rami lanceolate.

Uropod (Fig. 10L): basis triangular, with 8 plumose setae; endopod 12 setae on distal margin, and 5 setae and on lateral margin; endopod broadening toward the distal end, with long setae; exopod shorter than endopod, with 10 setae and 2 spines on distal margin.

Female: Antennule (Fig. 9E) short; segment 3 with much fine hair on inner margin.

Etymology: Saikai is the name of the National Park where the type locality is located.

Remarks: The present new species is allied to *Eurydice nipponica* Bruce & Jones, 1981, recorded from various parts of southern Japan. But the former is separated from the latter in the following features: (1) longer antenna, (2) longer and numerous segmentation of antennule, (3) shape of posterior end of pleotelson, (4) shorter stylus of male second pleopod, (5) sinuate margin of pleopod 7 and (6) smaller eyes.

The present new species is also allied to *Eurydice orientalis* Hansen, but the former is separated from the latter in the following features: (1) weaker dentations of posterior end of pleotelson, (2) shape of stylus on male second pleopod, especially longer apical projection, (3) numerous segments of antennule, (4) longer rami of pleopods, (5) strongly sinuate margin of pereopods 7 and (6) smaller eyes.

***Metacirrolana shijikiensis* n. sp. [J. n.: Shijiki-sunahorimushi-modoki, new]**

(Figs. 11-12)

Material examined: 1♂ (holotype, 3.2 mm in body length), Mouth of Shijiki Bay, (St. 1), off Ehonohana, May 10, 1984, coll. Mikio Azuma and 2♀♀ (1♀ allotype, 2.6 mm in body length and 1♀ paratypes, 2.4 mm in body length) and 1♀ (paratype, 2.9 mm in body length), Mouth of Shijiki Bay (St. 3), May 10, 1984, coll. Mikio Azuma. Type series is deposited as follows: holotype (TOYA Cr-13675) and allotype (TOYA Cr-13676) at Toyama Science Museum, 2 paratypes (OMNH Ar-7613) at Osaka Museum of Natural History.

Description: Color white in alcohol. Body oval and 2.4 times as long as the widest part, fourth pereonal somite. Cephalosome round, without anterolateral lobes. Eyes relatively big and each eye with about 22 ommatidia. Pleonal somites short and equal in length. Pleotelson (Fig. 11J) sinuate, with 20 teeth around the posterior margin.

Antennule (Fig. 11B) with 8 segments; posterior 4 segments long. Antenna (Fig. 11C), reaching the anterior part of third pereonal segment; flagellum composed of 10 segments. Mandible (Fig. 11D and E): pars incisiva weakly 4-headed; processus molaris wide; palp segment 2 long, with several setae on distal area; terminal segment. Maxillula

(Fig. 11F): inner lobe with 3 plumose setae; outer lobe with 11 simple teeth. Maxilla (Fig. 11G): endopod with 3 setae; inner lobe of exopod, with 4 setae; outer lobe of the same broken. Maxilliped (Fig. 11H): endite lanceolate; palp narrow and 5-segmented; epipodite narrow.

Pereopod 1 (Fig. 12A): basis rectangular; ischium half the length of basis, with 2 setae on distal end; merus triangular, with 2 groups of 2 setae on inner margin; carpus triangular, with 2 stout setae at outer distal angle; propodus subchelate, with 5-6 setae on inner margin.

Pereopod 2 (Fig. 12B): a little longer than pereopod 1: basis with a seta at inner distal angles; ischium with 2-3 setae on inner margin and a seta at sternal area; merus with 5-6 setae on inner margin; carpus square and much shorter than merus; propodus subchelate, with 4-5 setae on inner margin.

Pereopod 3 (Fig. 12C) as long as pereopod 2: basis with a seta at inner distal angles; ischium with 2-3 setae on inner margin and a seta at sternal area; merus with 5-6 setae on inner margin; carpus much shorter than merus, with 2 setae at inner distal angle; propodus subchelate, with 5-6 setae on inner margin.

Pereopod 4 (Fig. 12D) as long as pereopod 2: basis with a seta at inner distal angles; ischium with 2-3 setae on inner margin and a seta at outer distal angle; merus almost square, with 5-6 setae on inner margin; carpus square, with 2 setae on inner margin; propodus as long as carpus, with 2 setae on inner margin.

Pereopod 5 (Fig. 12E) longer than the preceding ones: basis 4 times as long as wide, with 2-3 setae at inner distal angle; ischium half the length of basis, with 3 setae at inner distal area and a seta at outer distal angle; merus half

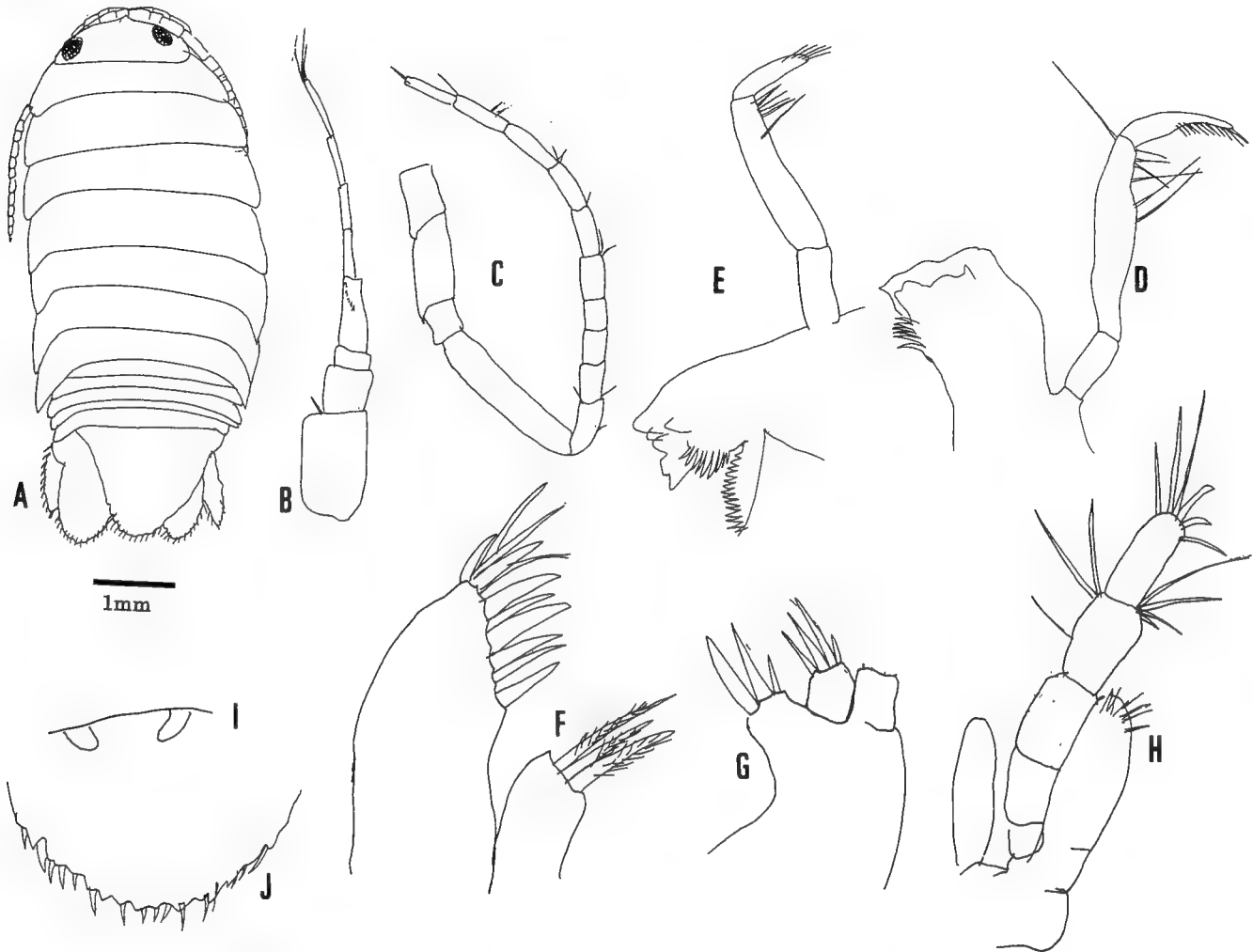


Fig.11 *Metacirolana shijikiensis* n.sp.

A: Dorsal view; B: Antennule; C: Antenna; D: Right mandible; E: Left mandible; F: Maxillula; G: Maxilla; H: Maxilliped; I: Penes; J: Posterior margin of pleotelson (All: holotype male).

the length of ischium; carpus as long as merus, with 3 setae at inner distal angle and 3 setae at outer distal angle; propodus a little longer than carpus.

Pereopod 6 (Fig. 12F): basis 3 times as long as wide, with 2 setae at inner distal angle; ischium 0.6 times as long as bases, with 2 groups of 1-2 setae on inner margin; merus 3/4 as long as ischium, with 2 setae of both margins of distal margin; carpus as long as merus, with 6-7 setae on inner margin and 9-10 setae on outer margin; propodus; a little shorter than ischium, with 2 setae on inner margin.

Pereopod 7 (Fig. 12G): basis 4.5 times as long as wide; ischium with a long setae on inner margin; merus a little shorter than ischium, with 2 setae on distal margin; carpus with 7-8 setae on distal margin; propodus a little longer than carpus.

Penes (Fig. 11I): rather short, each penis about twice as long as wide.

Pleopod 1 (Fig. 12H): basis rectangular; endopod lanceolate, with 6-7 setae around the margin; exopod lanceolate and longer than endopod, with 10 setae around the margin.

Pleopod 2 (Fig. 12I): endopod round; stylus beyond the endopod.

Uropod (Fig. 12J): basis triangular; endopod elliptical, with sinuate margin and 10 setae; exopod rectangular, with sinuate margin and 10 setae.

Female differs from male in the sexual characters.

Etymology: "Shijiki" is the name where the type series was collected.

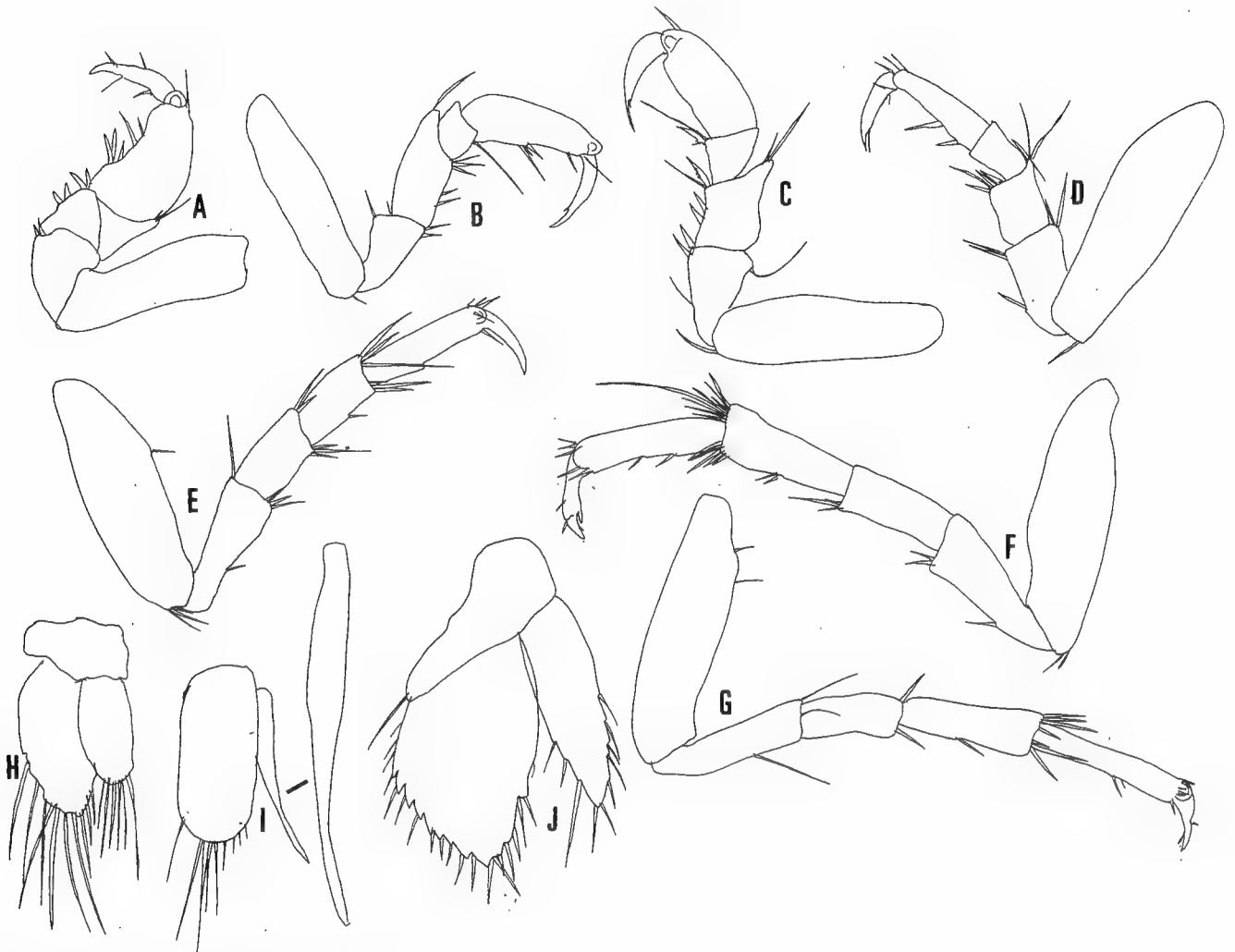


Fig.12 *Metacirolana shijikiensis* n.sp.

A-G: Pereopods 1-7; H-I: Pleopods 1-2; J: Uropod (All: holotype male).

Remarks: As far as I am aware, 30 species of the genus *Metacirolana* have been reported. Among them, the present new species is most closely allied to *Metacirolana japonica*, originally reported from "Eddo" which means Tokyo (Hansen, 1890). But the former is separated from the latter in the following features: (1) shorter body, especially, shorter pleonal segments, (2) stronger sinuate margin of pleotelson, (3) shorter penes, (4) longer flagellum of antennule and (5) smaller eyes.

***Excirolana chiltoni* (Richardson, 1905) [J. n.: Hime-sunahorimushi]**

Material examined: 1♂3♀, Shijiki-machi, intertidal, June 8, 1994, coll. Noboru Nunomura.

Family Cymothoidae

***Ceratothoa* sp.**

Material examined: 1♂, off Oda, Aug. 27, from the mouth of porgy, *Dentex tumifrons* (Temminck and Schlegel, 1844 Aug. 29, 2007, coll. Noboru Nunomura.

Suborder Sphaeromatidea

Family Sphaeromatidae

Subfamily Cassidininae

***Leptosphaeroma gottschei* Hilgendorf, 1885 [J. n.: Hirata-umisemi]**

Material examined: 1♀, Shijiki-machi, intertidal, June 6, 1994, coll. Noboru Nunomura; 5♂♂8♀♀, Oda, intertidal, June 7, 1994, coll. Noboru Nunomura; 7exs. Ooshijiki-machi, Aug. 27, 2007, coll. Noboru Nunomura; 9exs, shores between Ooshijiki-machi and Megazaki, Aug. 26, 2007, coll. Noboru Nunomura; 4exs. Semi-zakii, Aug. 27, 2007, coll. Noboru Nunomura; 18exs, Oda, Aug. 26, 2007, coll. Noboru Nunomura; 5exs, Ooshijiki-machi, Aug. 26, 2007, coll. Noboru Nunomura.

Subfamily Sphaeromatinae

***Chitonosphaera lata* (Nishimura, 1968) [J. n.: Habahiro-kotsusmubumushi]**

Material examined: 4♂♂6♀♀, Shijiki-machi intertidal, June 6, 1994, coll. Noboru Nunomura.

***Cymodoce acuta* Richardson, 1904 [J. n.: Futotoge-kotsubumushi]**

Material examined: 1♂, Shijiki Bay (St. 35), May 12, 1984, coll. Mikio Azuma; 1♂, Shijiki Bay (St. 27) coll. Mikio Azuma; 2♂♂9♀♀, Shijiki Bay sandy bottom, 8m depth, May 1984, coll. Mikio Azuma; 3♀♀, Shijiki Bay 21m, sandy bottom, (St. 32), May 12, 1984, coll. Mikio Azuma; 2♀♀, Shijiki Bay (St. 33), 22m depth sandy bottom, May 12, 1984, coll. Mikio Azuma.

***Cymodoce japonica* Richardson, 1907 [J. n.: Nihon-kotsubumushi]**

Material examined: 1♂1♀, Shijiki Bay (St. 21), May 11, 1984, coll. Mikio Azuma.

***Cymodoce* sp. (aff. *japonica* Richardson, 1907)**

Material examined: 1♀, Shijiki-Bay, (St. 43), 8m depth, June 13, coll. Mikio Azuma; 8♀♀, Shijiki-Bay (St. 42), June 13, coll. Mikio Azuma.

***Dynoides dentisinus* Shen, 1929 [J. n.: Shiriken-umisemi]**

Material examined: 13♂♂29♀♀, Shijiki-machi, intertidal, June 6, 1994, coll. Noboru Nunomura; 14♂♂31♀♀, Shijiki-machi, intertidal, June 7, 1994, coll. Noboru Nunomura; 1♂3♀♀, Shijiki-machi, intertidal, June 8, 1994, coll. Noboru Nunomura; 6♀♀, Ooshijiki-machi, intertidal, Aug. 26, 2007, coll. Noboru Nunomura; 3♀♀, Ooshijiki-machi, intertidal, Aug. 27, 2007, coll. Noboru Nunomura; 10♂♂2♀♀, Semi-saki, Aug. 27, 2007, coll. Noboru

Nunomura; 1♂11♀♀, Oda, intertidal, Aug. 26, 2007, coll. Noboru Nunomura; 8exs, shores between Ooshijiki-machi and Megazaki, intertidal, Aug. 26, 2007, coll. Noboru Nunomura.

***Gnorimosphaeroma ovatum* (Gurjanova, 1933) [J. n.: Maru-kotsubumushi]**

Material examined: 1♀, Tanouchi, May 12, 1983. coll. Mikio Azuma; 8exs, May 15, 1983, coll. Mikio Azuma.

***Sphaeroma sieboldii* Dollfus, 1888 [J. n.: Nanatsuba-kotsubumushi]**

Material examined: 4 youngs, Iida-ura, Shijiki Bay, June 22, 1986, coll. Mikio Azuma; 8♀♀, Funakoshi, Shijiki Bay, Aug. 26, 2007, coll. Noboru Nunomura.

***Sphaeroma rotundicaudum* n. sp. [J. n.: Maruo-kotsubumushi, new]**

(Figs 13 and 14)

Material examined: 6♂♂ (1♂ holotype, 12.8 mm in body length and 5♂♂ paratypes, 7.2-11.1mm in body length) and 14♀♀ (1♀ allotype, 12.0 mm in body length and 13 ♀♀ pratypes, 7.3-12.0 mm in body length), Shijiki, Hirado-shi, Nagasaki. Type series is deposited as follows: holotype (TOYA Cr-13661), allotype (TOYA Cr-13662) and 6 paratypes (TOYA Cr-13662~13668) at Toyama Science Museum. 5 paratypes (OMNH Ar-7614) at Osaka Museum

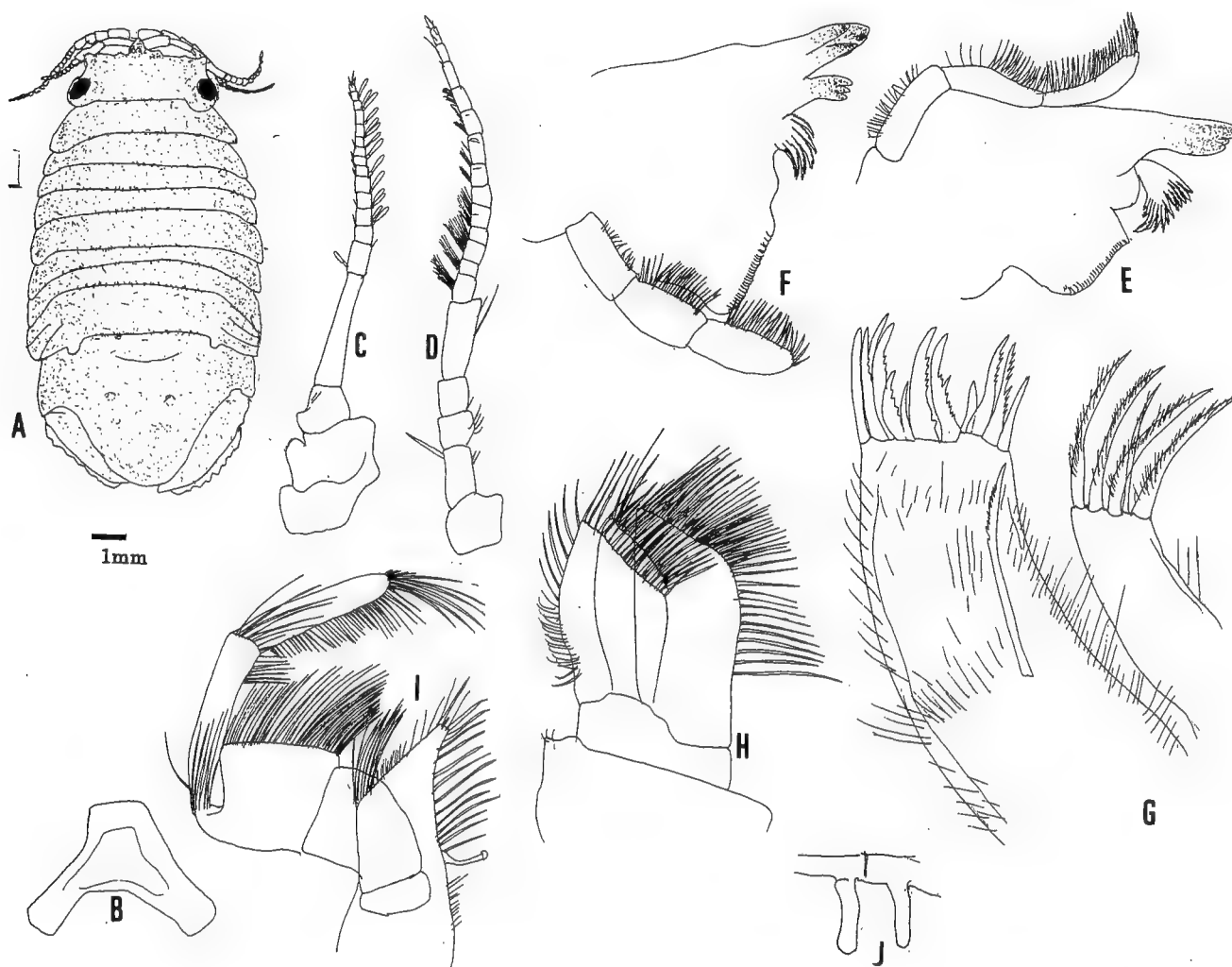


Fig.13 *Sphaeroma rotundicaudum* n.sp.

A: Dorsal view; B: Frontal lamina ; C: Antennule; D: Antenna; E: Right mandible; F: Left mandible; G: Maxillula; H: Maxilla; I: Maxilliped; J: Penes (All: holotype male).

of Natural History and 5 paratypes (NSMT-Cr 17983) at National Museum of Nature and Science, Tokyo; 2 paratypes (KMNH IVR 500, 237-500, 238) at Kitakyushu Museum of Natural History and Human History. Other specimens: 4 ♂♂ 17 ♀♀, Shijiki, June 7, 1994, coll. Noboru Nunomura; 1 ♀, Off Oda, Aug. 28, 2007, coll. Noboru Nunomura.

Description: Body 1.8 times as long as wide, and broadest at 5-6 pereonal somites. Cephalon with lateral area expanded. Eyes small, each eye composed of about 150 ommatidia. Anterior suture line on pleon a little shorter than posterior one.

Antennule (Fig. 13C) with 3 stout peduncular segments and 14-18 flagellar segments. Frontal lamina as Fig. 13B.

Antenna (Fig. 13D) with 5 peduncular segments and 12-14 flagellar segments. Right mandible (Fig. 13E): pars incisiva 3-headed; lacinia mobilis lacking; processes molaris wide; palpal segment 2 with 25 setae on inner margin; palpal segment 3 with 40 setae on inner margin. Left mandible (Fig. 13F): pars incisiva 3-toothed; lacinia mobilis 3-toothed, processus molaris wide; palpal segment 2 with 35 setae on inner margin; palpal segment 3 with 30 setae on inner margin. Maxillula (Fig. 13G): endopod with 5 long plumose setae at the tip; exopod with 12 setae in distal corner, 7-8 serrated one on distal margin and a serrated seta on lateral margin. Maxilla (Fig. 13H): endopod with 40 setae; inner lobe of exopod with 16-17 setae and outer lobe of the same with 20-21 setae. Maxilliped (Fig. 13I): endite rectangular, with 13 plumose setae on distal margin and a coupling hook on lateral margin; palp 5-segmented, segment 1 short; segment 2 wide, segment 3 wide, with many setae on inner and distal margins; segment 4 slender; segment 5 slender, with many setae on inner and distal margins.

Pereopod 1 (Fig. 14A): basis 3.3 times as long as wide, with a bundle of setae on the middle area of outer margin; ischium 1.4 times longer than basis, with many long setae on outer margin; merus 0.6 times as long as ischium, with relatively short setae on inner margin and many long setae on outer margin; carpus triangular, with many setae on inner margin and a long seta at inner distal angle; propodus as long as merus, with many long setae on inner margin and distal area of outer margin.

Pereopod 2 (Fig. 14B) longer than pereopod 1: basis 3.2 times as long as wide; ischium almost as long as basis, with about 25 long setae on outer margin; merus 0.6 times as long as ischium with many long setae on outer margin; carpus 0.7 times as long as merus, with shorter setae on inner margin and longer setae on outer margin; propodus 1.2 time longer than merus, with many setae on inner margin.

Pereopod 3 (Fig. 14C): basis 3.7 times as long as wide; ischium as long as basis, with 13-14 long setae on outer margin; merus half the length of ischium, with much short hair on inner margin; carpus a little longer than merus, with much hair on inner margin and 3 relatively long setae on outer distal area; propodus 1.4 times longer than carpus, with many short hair on inner margin.

Pereopod 4 (Fig. 14D) stout: basis 2.3 times as long as wide, outer margin convex, with many setae on outer margin; ischium 2/3 as long as basis with many setae on distal half of inner margin and many longer setae on outer margin; merus 0.35 times as long as ischium, with many setae on both margins; carpus short, 2/3 as long as merus, with many setae on inner margin; propodus 1.5 times longer than merus, with many setae on inner margin.

Pereopod 5 (Fig. 14E) stout: and similar to pereopod 4: basis 1.7 times as long as wide; with many seta on outer margin; ischium as long as basis with many setae on distal half of inner margin and many longer setae on outer margin; merus 0.4 times as long as ischium, with many setae on both margins; carpus short, 2/3 as long as merus, with many setae on inner margin; propodus a little longer than merus, with many setae on inner margin.

Pereopod 6 (Fig. 14F): basis 2.7 times as long as wide, with much setae on both margins; ischium 0.7 times as long as wide, with many setae on both margins; merus half the length of ischium, with many long setae on both margins; carpus 0.6 times as long as ischium, with many setae on inner margin; propodus twice longer than carpus, with many setae on inner margin and shorter setae on outer margin.

Pereopod 7 (Fig. 14G): basis 3.0 times as long as wide, with many long setae on both margins; ischium 0.7 times as long as basis, with many setae on both margins; merus half the length of ischium, with many setae on both margins; carpus as long as merus, with many setae on outer distal area; propodus 1.5 times longer than carpus, with 10-15 short setae on both margins; dactylus long.

Penes (Fig. 13J) paired and narrow.

Pleopod 1 (Fig. 14H): basis short, with 3 coupling hooks; endopod rectangular, with about 35 setae; exopod triangular, with about 40 setae.

Pleopod 2 (Fig. 14I): basis short; endopod triangular, stylus arising from basal area of lateral margin and extending as long as endopod; exopod with about 50 plumose setae around the margin.

Pleopod 3 (Fig. 14J): basis; endopod triangular, with about 20 setae; exopod rectangular.

Pleopod 4 (Fig. 14K): basis small; endopod thickened; exopod two-segmented, with about 30 setae and much hair around the margin.

Pleopod 5 (Fig. 14L): endopod lanceolate; exopod two-segmented, with 4 bosses.

Uropod (Fig. 14M): basis rounded; endopod lanceolate; exopod with 7 teeth on outer margin.

Female differs from male in the sexual characters. A female bears 12 eggs in her brood pouch.

Etymology: "rotundus" means round in Latin and "cauda" means tail in Latin".

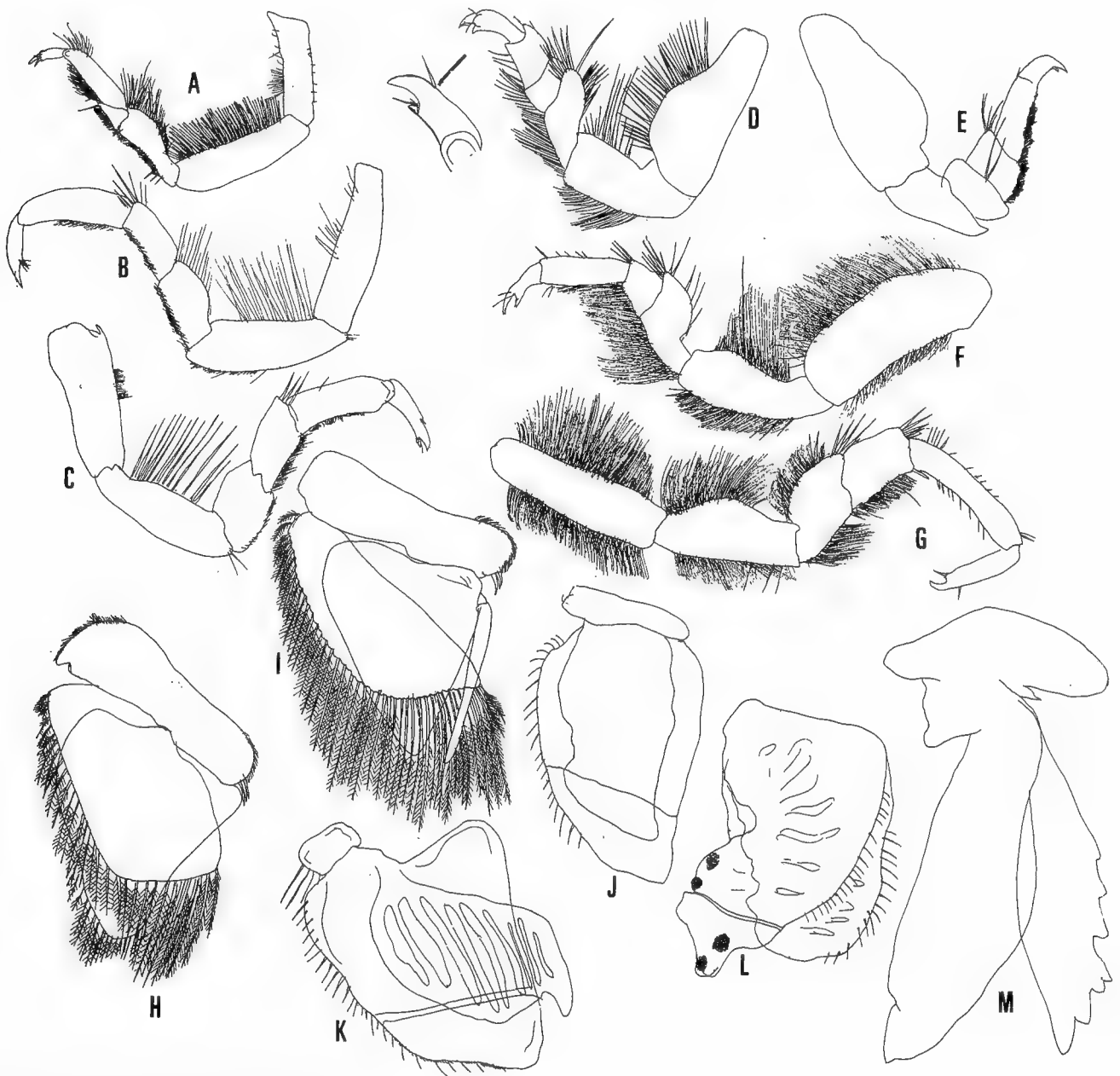


Fig.14 *Sphaeroma rotundicaudum* n.sp.

A-G: Pereopods 1-7 (setae of pereopod 5 abbreviated); H-L: Pleopods 1-5; M: Uropod (All: holotype male).

Remarks: The present new species is very closely allied to *Sphaeroma sieboldii* Dollfus, 1880. But the former is separated from the latter in the following features: (1) presence of stylus on male second pleopod, (2) numerous flagellum of antennule, (3) numerous coupling hooks on lateral margin of endite of maxilliped and (4) protruded apical area of clypeus.

Sphaeromatinae sp. 1

(Fig. 15)

Material examined: 1 ♀ (8.6mm in body length), Shijiki Bay (St. 14), May 13, 1984, coll. Mikio Azuma. The present specimen will be deposited at the Toyama Science Museum.

Description of a specimens from Shijiki Bay: Color white in alcohol. Body 2.0 times as long as the widest part. Body surface granulated. Cephalosome round; without dorsal elevation and without anterolateral lobes. Eyes relatively big, but number of ommatidia of each eye not discerned. Pleon narrower than the preceding part, with 2 suture lines. Pleotelson (Fig. 15A) sinuate, with posterior margin rounded.

Antennule (Fig. 15B) basal area stout composed of 3 peduncular segments; flagellum composed of 8 segments. Antenna (Fig. 15C) 13-14 flagellar segments.

Mouth pars unfortunately missing. Only a mandibular palp is remained; second segment with 11 setae on distal half; terminal segment with 13 setae.

Pereopod 1 (Fig. 15D): basis 4.5 times as long as wide; ischium 0.4 times as long as basis; merus a little shorter than ischium, with 4 setae on inner margin and 2 setae on distal angle; carpus triangular, with 2 stout setae on inner margin; propodus rectangular, round with 3 trifurcate setae on inner margin.

Pereopod 2 (Fig. 15E) a little longer than pereopod 1: basis 4 times as long as wide, with a long seta at inner distal angle; ischium 0.7 times as long as basis, with a seta on outer margin; merus 0.4 times as long as ischium, with 4 setae on inner margin and 2 setae on outer distal angle; carpus as long as merus, with 5 setae on inner margin and 3 setae on outer distal angle; propodus 1.3 times longer than carpus, with 8-9 setae on inner margin.

Pereopod 3 (Fig. 15F): basis 4 times as long as wide; ischium 2/3 as long as wide, with 2 setae on inner margin and 4 setae on outer margin; merus half the length of ischium, with 4 setae on inner margin and 3 plumose setae at outer distal angle; carpus a little shorter than merus with 3-5 setae on inner margin and a seta at outer distal angle; propodus 1.6 times longer than merus, with 3 setae on inner margin.

Pereopod 4 (Fig. 15G): basis 3.3 times as long as wide; ischium 0.8 times as long as basis; merus half the length of ischium, with 5-7 setae on inner margin and 3 setae on outer distal angle; carpus a little longer than merus, with 6 setae on inner margin and a seta at outer distal angle; propodus 1.4 times longer than carpus, with 3 setae on inner margin.

Pereopod 5 (Fig. 15H): basis 3.5 times as long as wide, with a seta at inner distal angle; ischium 2/3 as long as basis, with 4-5 setae on sternal margin; merus 0.4 times as long as ischium, with 2 setae on inner margin and 2-3 setae at outer distal angle; carpus a little longer than merus, with 6 setae on inner margin and a seta at outer distal angle; propodus 1.6 times longer than carpus, with 3 setae on inner margin.

Pereopod 6 (Fig. 15I): basis 4.7 times as long as wide; ischium 0.7 times as long as basis, with 2 setae including one on inner margin and a setae at outer distal angle; merus with 3 setae including one on inner margin and 2 setae at outer distal angle; carpus with 7 setae on inner margin and a seta at outer distal angle; propodus 1.9 times longer than carpus, with 3 setae on inner margin.

Pereopod 7 (Fig. 15J): basis 4 times as long as wide; ischium half the length of basis, with 2 setae on outer margin; merus 0.4 times as long as ischium; carpus as long as, merus, with 8 setae on inner margin and 8 setae on distal margin; propodus 1.3 times longer than carpus, with 4 setae on inner margin.

Pleopod 1 (Fig. 15K): both rami rectangular.

Pleopod 2 (Fig. 15L): basis; endopod stylus beyond the endopod; exopod broad-lanceolate.

Pleopod 3 (Fig. 15M): both rami rectangular and apical part tapering towards the tip.

Pleopod 4 (Fig. 15N): both rami elongated and apical part round.

Pleopod 5 (Fig. 15O): endopod one-fourth tapering toward the tip.

Uropod (Fig. 15P): basis; endopod rectangular, with 16 setae; exopod lanceolate and 0.7 times as long as endopod, with sinuate margin and 17-18 setae.

Remarks: The only one imperfect female specimen was available to me. Therefore, I could not identify even the genus name.

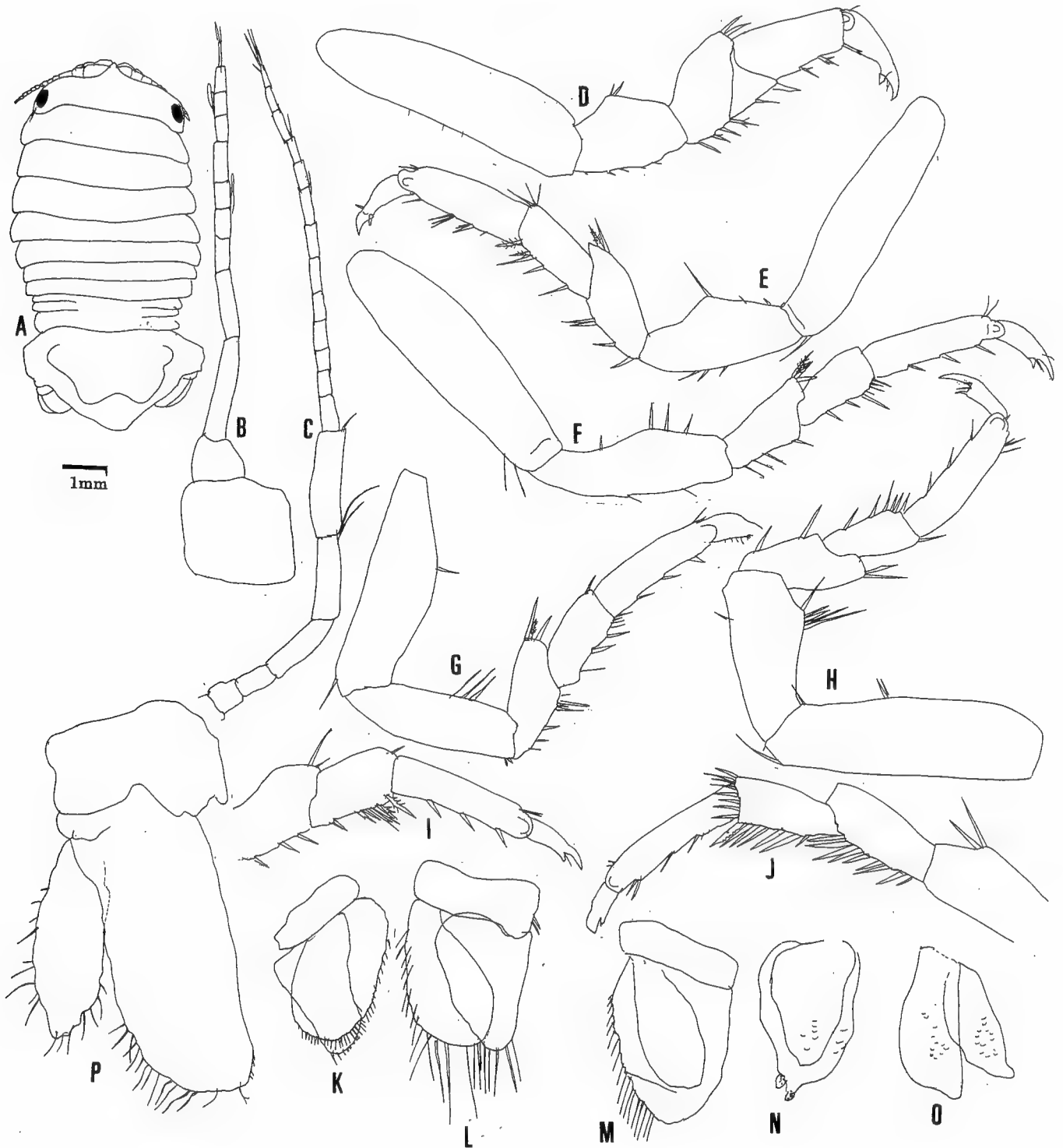


Fig.15 *Sphaeromantinae* sp.1

A: Dorsal view; B: Antennule; C: Antenna; D-J: Pereopods 1-7; K-O: Pleopods 1-5; P: Uropod (All: Female from Shijiki Bay).

Sphaeromatinae sp. 2

(Fig. 16)

Material examined: 1♀ (6.3mm in body length, Shijiki Bay (St. 25), May 13, 1984, coll. Mikio Azuma.) The present specimen will be deposited at the Toyama Science Museum.

Description of specimen from Shijiki Bay: Color pale white in alcohol. Body 2.3times as long as the widest part, fourth pereonal somite. Cephalosome round. Eyes relatively big and each eye with about 50 ommatidia. Pleon with 2 perfect suture line. Posterior end of pteolelson eith a cleft at the tip. Antennule (Fig. 16B) 12-segmented. Antenna (Fig. 16C) a little longer than antennule, composed of 5 peduncular segments and 10 flagellar segments.

Mandible (Fig. 16D): par incisiva weakly 3-headed; lacinia mobilis 6-headed; palp 3-segmented; segment 2 with 5-6 setae on distal part of lateral; margin; segment 3 with 5 setae. Maxillula (Fig. 16E and F): inner lobe with 4

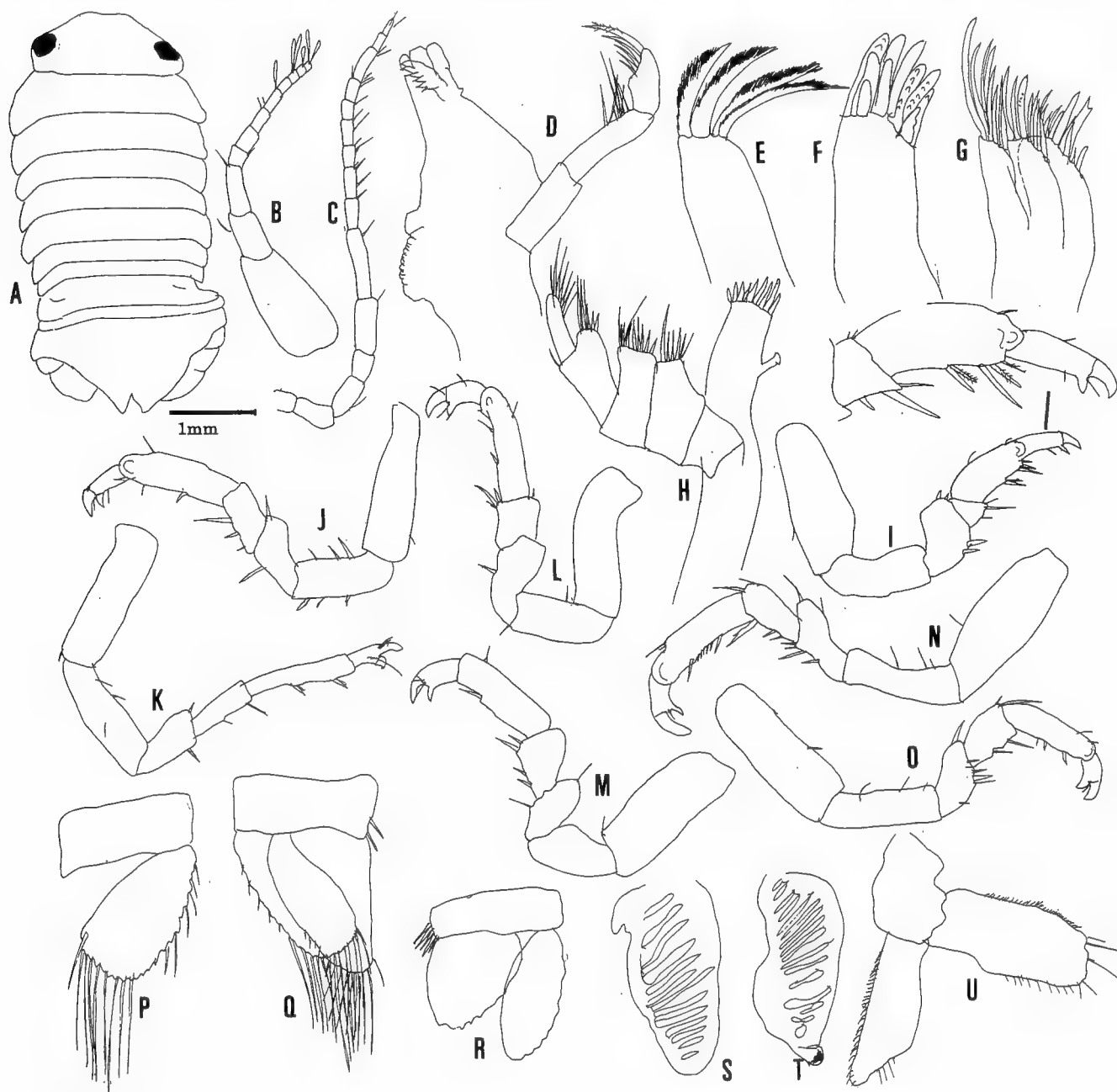


Fig.16 Sphaeromatinae sp.2

A: Dorsal view; B: Antennule; C: Antenna; D: Mandible; E: Endopod of maxillula; F: Exopod of the same; G: Maxilla; H: Maxilliped; I-O: Pereopods 1-7; P-T: Pleopods 1-5; U: Uropod (All: Female from Shijiki Bay).

plumose setae; outer lobe with 10 setae. Maxilla (Fig. 16G): endopod with 15 setae; both lobes of exopod with 7 teeth. Maxilliped (Fig. 16H): endite rectangular, with a coupling hook on lateral margin and 9 plumose setae on apical margin; palp five-segmented; segments 2-4 wide and protruded innerward, bearing many setae on inner margin.

Pereopod 1 (Fig. 16I): basis 2.6 times as long as wide, ischium 0.7 times as long as basis, with 2 short setae on inner margin; merus 0.4 times as long as ischium, with 2 setae on both margins; carpus triangular, with 3 setae on inner margin; propodus with 2 groups of 3 setae on inner margin.

Pereopod 2 (Fig. 16J): a little longer than pereopod 1: basis 3.4 times as long as wide; ischium 0.6 times as long as basis, with 3-4 setae on both margins; merus 0.6 times as long as ischium, with a relatively long seta on inner margin and seta at pouter distal area; carpus as long as merus, with 3 setae on inner margin; propodus with 2 setae on inner margin.

Pereopod 3 (Fig. 16K): basis 3.9 times as long as wide; ischium 0.8 times as long as basis; merus 0.6 times as long as ischium, with a seta on both margins; carpus almost as long as merus, with 2 setae on inner margin; propodus 1.5 times longer than carpus, with 3 setae on inner margin.

Pereopod 4 (Fig. 16L): basis 2.9 times as long as wide; ischium 2/3 times as long as basis; merus 0.7 times as long as ischium; carpus 1.3 times longer than merus; propodus 2.6 times longer than carpus, with 2 setae on inner margin.

Pereopod 5 (Fig. 16M): basis 2.6 times as long as wide; ischium 0.7 times as long as basis; merus 0.7 times as long as ischium; carpus 1.4 times longer than merus; propodus 1.8 times longer than carpus, with a seta on inner margin.

Pereopod 6 (Fig. 16N): basis 2.7 times as long as wide; ischium 0.7 times as long as basis; merus 0.6 times as long as ischium; carpus a little longer than merus; propodus 1.7 times longer than carpus, with 2 bigger and several smaller setae on inner margin.

Pereopod 7 (Fig. 16O): basis 3.1 times as long as wide; ischium 0.7 times as long as basis; merus 0.4 times as long as ischium; carpus as long as merus; propodus 1.7 times longer than carpus, with 3-4 setae on inner margin.

Pleopod 1 (Fig. 16P): basis rectangular; endopod unfortunately lacking; exopod lanceolate, with 15 setae.

Pleopod 2 (Fig. 16Q): basis rectangular; endopod triangular; exopod rectangular.

Pleopod 3 (Fig. 16R): basis rectangular; endopod broad and lanceolate; exopod narrow lanceolate.

Pleopod 4 (Fig. 16S): endopod thickened. Pleopod 5 (Fig. 16T): endopod thickened, with a boss at the tip.

Uropod (Fig. 16U): basis rectangular; endopod lanceolate, with 3 longer and many short setae; exopod rectangular, with many short setae.

Remarks: The present specimen belongs to the subfamily Sphaematinae. But, only an imperfect specimen was at my proposal, therefore, I could not determine the genus.

Subfamily Dynameninae

***Holotelson tuberculatus* Richardson, 1909 [J. n.: Shiriken-umisemi]**

Material examined: 17♂♂20♀♀18youngs, Shijiki Bay, June, 12, 1977, coll. Mikio Azuma: 2♀♀, Shijiki Bay, (St. 21), 25m depth, sand, May 13, coll. Mikio Azuma.

Suborder Limnoriidea

Family Limnoriidae

***Limnoria hiradoensis*, n. sp. [J. n.: Hirado-kikuimushi, new]**

(Fig. 17)

Material examined: 1♂ (holotype, 3.3mm in body length), Shijiki Bay. Off Nokozaki (St. 33), May 10, 1984, coll. Mikio Azuma, and 1♂ (paratypes, 2.0mm in body length), Shijiki Bay. (St. 8), 16m depth, sand, May 10, 1984, Mikio Azuma, and 3♀♀ (1♀ allotype, 2.9 mm in body length and 2♀♀ paratypes, 3.1-3.9 mm in body length). Off Iida-bana, (St. 45), May 10, 1984, Mikio Azuma, sandy bottom, coll. Mikio Azuma. Type series is deposited as

follows: holotype (TOYA Cr-13677), allotype (TOYA Cr-13678) and a paratype (TOYA Cr-13679) at Toyama Science Museum, a paratype (OMNH Ar-7615) at Osaka Museum of Natural History, and a paratype (NSMT Cr-17984) at National Museum of Nature and Science, Tokyo.

Description: Body cylindrical, 2.6 times as long as wide. Color yellowish white in alcohol. Cephalosome round. Eyes relatively big and each eye with about 25 ommatidia. Lateral margin of cephalosome and pereonal somite 1 incised; Pereon parallel. Pleon with 5 distinct segments. Pleotelson round, wider than long.

Antennule (Fig. 17C) five-segmented; terminal segment with 6 aesthetascs at the tip. Antenna (Fig. 17D) a little longer than antennule, composed of 5 segments. Right mandible (Fig. 17E): pars incisiva 2-headed; lacinia mobilis and processus molaris absent. Left mandible (Fig. 17F): pars incisiva 3-4 headed; lacinia mobilis and processus molaris absent. Maxillula (Fig. 17G): endopod with 3 plumose setae; exopod with 11 setae on distal margin. Maxilla (Fig. 17H): endopod with 7 setae; both lobes of exopod with 3 setae. Maxilliped (Fig. 17I): basis rectangular, with a coupling hook on lateral margin and 10 plumose setae on distal margin; palp five-segmented, terminal segment round; epipodite rather stout, with sinuate margin.

Pereopod 1 (Fig. 17J): basis 2.8 times as long as wide, with relatively short setae on outer margin; ischium $2/3$ as long as basis, with several setae on distal margin; merus 0.4 times as long as ischium, with 6-8 setae on inner margin; carpus short and triangular; propodus robust, with a stout seta at distal area and a group of setae basal area on inner margin.

Pereopod 2 (Fig. 17K): basis rectangular, 2.2 times as long as wide, with several setae on inner margin; ischium 0.7 times as long as basis, with 7-8 setae on inner margin; merus 0.8 times as long as ischium, with 2 protuberances and 3 setae on inner margin; carpus rectangular, with a seta and a protuberance on inner margin and a seta at outer distal angle; propodus twice longer than carpus, with 2 protuberances on inner margin and 3 setae on outer margin.

Pereopod 3 (Fig. 17L) a little longer than pereopod 2: basis 2.8 times as long as wide, with 2 setae at inner distal angle; ischium half the length of basis, with about 10 setae on inner margin; merus 0.4 times as long as ischium, with 4-5 setae on inner margin and a seta at outer distal angle; carpus rectangular and half the length of merus, with 2 setae on inner margin; propodus 2.6 times longer than carpus, with 2-3 setae on inner margin and 3-4 setae on outer margin.

Pereopod 4 (Fig. 17M): basis 1.9 times as long as wide; ischium half the length of basis; merus 0.6 times as long as ischium, with several short setae on inner margin and a seta on outer margin; carpus 0.7 times as longer as merus, with 5-6 setae and on inner margin; propodus 1.2 times longer than carpus.

Pereopod 5 (Fig. 17N): basis 2.2 times as long as wide, with 4-5 setae on inner margin and 2-3 setae on outer margin; ischium half the length of basis, with 3-4 setae on inner margin and a long seta on outer margin; merus half the length of ischium, with 3 setae on inner margin 6-7 short setae on outer margin and a setae at outer distal angle; carpus small and triangular, propodus $2/3$ as long as basis, with 8-10 setae on both margins.

Pereopod 6 (Fig. 17O) a little longer than the pereopod 5: basis 3.3 times as long as wide, with 6-7 short setae on outer margin; ischium a little shorter than basis, with 16-17 setae on inner margin and 2 setae on outer margin; merus 0.7 times as long as ischium, with 11-12 setae on inner margin and 7-9 setae on outer margin; carpus 0.6 times as long as merus, with 14-15 setae including a serrated one on inner margin; propodus 1.6 times longer than carpus, with 3 setae on inner margin and 13-15 setae on outer margin.

Pereopod 7 (Fig. 17P) longer than preceding ones: basis 3.3 times as long as wide, with a seta at inner distal angle; ischium 0.8 times as long as basis, with many short setae on inner margin; merus 0.6 times as long as ischium, with 5-6 relatively long setae on inner margin and a serrated seta at outer distal angle; carpus $2/3$ as long as merus, with a serrated seta on inner distal angle and 2 serrated setae at outer distal angle; propodus 1.3 times longer than carpus.

Penes (Fig. 17Q) contiguous, each penis 3 times as long as wide.

Pleopod 1 (Fig. 17R): basis rectangular; endopod rectangular, with 12-13 setae on outer margin; exopod crescent, with about 40 setae on outer margin.

Pleopod 2 (Fig. 17S): basis rectangular; endopod lanceolate, with 8 plumose setae around the margin, stylus arising

from the basal part of its inner margin semicircular, with; exopod as long as endopod.

Pleopod 3 (Fig. 17T): basis rectangular; endopod lanceolate, with setae; exopod lanceolate with setae.

Uropod (Fig. 17U): basis 4/5 as long as wide; endpod 1.7 times longer than basis, with 7-8 long setae on apical area; exopod, 1.2 times longer than basis and 0.7 times as long as endopod, with 3 setae on outer margin.

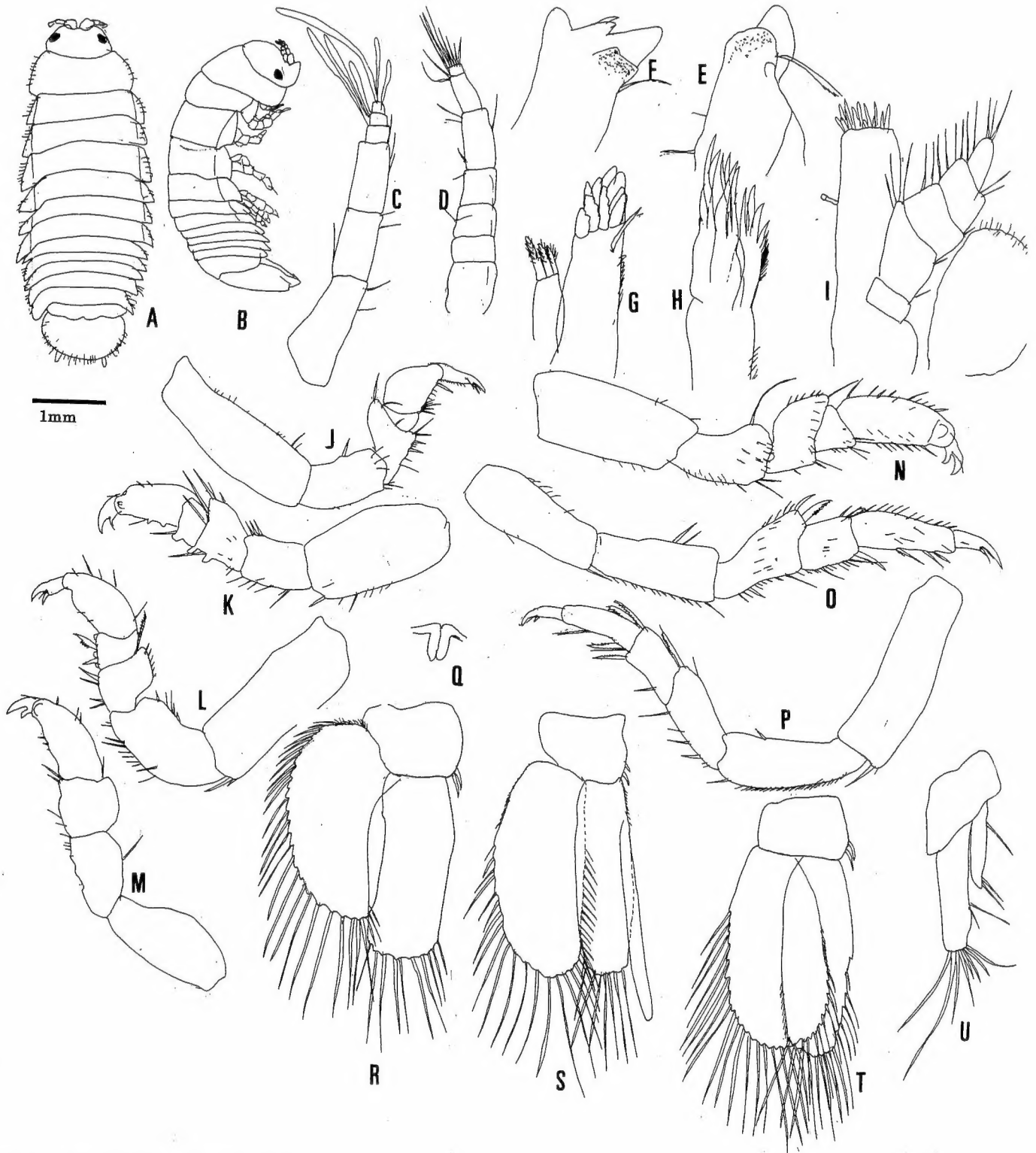


Fig.17 *Limnoria hiradoensis* n.sp.

A: Dorsal view; B: Lateral view; C: Antennule; D: Antenna; E: Right mandible; F: Left mandible; G: Maxillula; H: Maxilla; I: Maxilliped; J-P: Pereopods 1-7; Q: Penes; R-T: Pleopods 1-3; U: Uropod (All: holotype male).

Female: differs from male in the sexual characters.

Etymology: Hirado is the name of the island including the type locality.

Remarks: The Present new species is allied to *Limnoria japonica* Richardson, 1909, reported from Noto Peninsula, but the present species is separated from *japonica* in the following features: (1) longer pereopod, (2) longer stylus of male second pleopod, (3) slenderer rami of uropod, (4) less numerous flagellar segments, (5) less numerous segments of pereopod, and (6) stouter epipodite of maxilliped.

The present new species is separated from *Limnoria saseboensis*, Menzies, 1957, which were reported from Sasebo, which is near Hirado, the type locality of the present species. The former is separated from in the following features: (1) absence of two parallel ridge on pleotelson, (2) longer exopod of uropod, (3) shorter basis of uropod, (4) round epipodite of maxilliped, (5) shorter basis of uropod and (6) longer rami of the same.

The present new species is separated from *Limnoria lignorum* Rathke, 1799, reported from Norway, in the following features: (1) broader epipodite of maxilliped, (2) longer exopod of uropod and (3) shape of apical part of antenna.

Suborder Oniscoidea

Family Ligiidae

***Ligia exotica* Roux, 1828 [J. n.: Funamushi]**

Material examined: 4♂♂, Shijiki-machi, intertidal, June 8, 1994, coll. Noboru Nunomura; 1♂1♀, Shijiki-machi intertidal, June 8, 1994, coll. Noboru Nunomura; 1♂1♀, Haifuku, intertidal, Aug. 27, 2007, coll. Noboru Nunomura.

***Ligia* sp. (aff. *L. exotica* Roux, 1828)**

Material examined: 1♂5♀♀, intertidal, June 8, 1994, coll. Noboru Nunomura; 1♂3♀♀, Semi-zaki, Aug. 27, 2007, coll. Noboru Nunomura; 1♂2♀♀, Ooshijiki-machi, intertidal, Aug. 26, 2007, coll. Noboru Nunomura.

Family Scyphacidae

***Armadilloniscus japonicus* Nunomura, 1984 [J. n.: Nihon-hama-warajimushi]**

Material examined: 5♀♀, Shijiki-machi, intertidal, June 8, 1994, coll. Noboru Nunomura.

Family Tylidae

***Tylos granuriferus* Budde-Lund, 1885 [J. n.: Hamadango-mushi]**

Material examined: 3♂♂11♀♀, Shijiki-machi, intertidal, June 8, 1994, coll. Noboru Nunomura.

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References

- Azuma, M and S. Jinno. 1980. The Bottom fauna Communities in Shijiki Bay Hirado Islands, An attempt at analysingf Habitat relations. *Bull. seikai regional Fisheries Research Lab.*, 54: 195-208. (in Japanese).
- Azuma, M. Y. Hano, and Y. Hano, 1985. The bottom fauna Communities in Shijiki Bay, Hirado Island-II. Habitat Analysis Based on Gammarids-Sediment Relations. *Benthos Research*. (28) p. 1-11. (In Japanese).
- Azuma, M & K. Katsumura, 1983. Feeding Interrelationships between Young Red Seabream and Cohabiting Fishes in

- Shijiki Bay. *Bull. Seikai Reg. Fish. Res. Lab.*, 59: 101-118. (in Japanese).
- Barnard, K. H. 1925. Contributions to the crustacean fauna of South Africa. 9. Further additions to the list of marine Isopoda. *Ann. South Afr. Mus.*, 20: 381-412.
- Barnard, K. H. 1957A. Additions to the fauna list of South African Crustacea. *Ann. Mag. Nat. Hist.* (12) 10: 1-12.
- Bruce, N. L. 1986. Cirolanidae (Crustacea: Isopoda) of Australia. *Rec. Aust. Mus. Suppl.* 6: 1-239.
- Bruce, N. L. & Jones, D. A. 1981. The Systematics and ecology of some cirolanid isopods from Southern Japan. *J. Natl. Hist.*, 15: 67-85.
- Dollfus, 1888. Sur quelques Crustacés Isopodes du littoral des Açores (3 Campagne de H'istore). *Bull. Soc. Zool. France*, 23 (1): 1-35.
- Gurjanova, E. F. 1933. Contributions to the Isopoda fauna of the Pacific Ocean. I. New species Valvifera and Flabellifera. *Expl. Mers russe. Gosudarstvennyi idrologicheskii Institut, Issledovaniia Morei SSSR.* 17: 87-106.
- Gurjanova, E. F. 1935. Contribution to the fauna of Isopoda of the Pacific Ocean. III. New species in collections of the Hydrological Institute collected in 1932. *Expl. Mers Russe (Gosudarstvennyi Hidrologicheskii Institut).* 22: 25-35.
- Gurjanova, E. F. 1936a. Beiträge zur Kenntnis der Isopoden fauna des Pazifischen Ozeans. IV. *Zool. Anz.*, 114 (9/10): 250- 265.
- Gurjanova, E. F. 1936b. Crustaceans. Isopoda des mers Orientals. *Faune de L' URSS.*, 7 (3): 1-278. (In Russian).
- Hale, H. M. 1946. Isopoda-Valvifera, *Reports - Series B, Zoology and Botany Antarctic Expedition 1929-1931* 5 (3): 161-212.
- Hanen, 1890. Cirolanidae et familiae nonnullae propincae Musei Hauniensis. Et Bidrag til Kundskaben om nogle Familier af isopode Krebsdyr Kongelige Danske Videnskabernes *Selskabs Skrifter*, 6te Raekke, *Naturvidenskabelig og matematisk Afdeling.* 3: 239-426.
- Holthuis, L. B. 1949 The Isopoda and Tanaidacea of the Netherlands, including the description of a new species of Limnoria. *Zool. Meded.* 30 (12): 163-190.
- King, R. A. 2003. *Neastacilla* Tattersall, 1921 redefined, with eight new species from Australia (Crustacea: Isopoda: Arcturidae). *Mem. Mus. Victoria*, 60 (2): 371-416.
- Kensley, B. 1975. Marine Isopoda from the continental shelf of South Africa. *Annals of the South African Museum*, 67 (4): 35-89.
- Kensley, B. 1978. Guide to the Marine Isopods of Southern Africa. Trust. South Africa Mus. Cape Town, 1-173.
- Koehler, R. 1911. *Arcturides nouveaux* provenant des campagnes de la "Princess Alice", ou appartenant au Musée océanographique de Monaco. *Bulletin Institut Océanographique (Monaco).* 214: 65.
- Kussakin, O. G. 1974. Fauna and ecology of isopods (Crustacea) from the intertidal zone of the Kurile Islands. *Trans. Acad. Sci. USSR, Far East Cent., Inst. Mar. Biol.*, 1: 227-275. [in Russian with English summary]
- Kussakin, O. G. 1975. A list of the macrofauna in the intertidal zone of the Kurile Islands, with remarks on zoogeographical structure of the region. *Publ. Seto Mar. Biol. Lab.*, 22 (1/4): 47-74.
- Kussakin, O. G. 1979. Marine and brackish-water Crustacea (Isopoda) of cold and temperate Waters of the Northern Hemisphere I, Suborder Flabellifera. *Acad. Sci. U. S. S. R.*, 122, 1-472. (in Russian).
- Kussakin, O. G. 1982. Marine and brackish-water Crustacea (Isopoda) of cold and temperate waters of the Northern Hemisphere II, Suborder Anthuridea Microcerberidea Valvifera, et Tyloidea. *Acad. Sci. U. S. S. R., Leningrad*, 1-462. [in Russian].
- Menzies, R. J. 1957. The marine borer family Limnoriidae (Crustacea, Isopoda Part J: Northern and Central America: Systematics, distribution, and ecology. *Bulletin of marine Science of the Gulf Caribbean* 7 (2): 101-200.
- Nunomura, N. 1984. Two new Idoteid Isopoda from Otsuchi Bay, northern Japan. *Bull. Toyama Sci. Mus.*, 6: 57-64.
- Nunomura, N. 1999. Sea shore Isopod Crustaceans collected from Izu Islands, Middle Japan. *Bull. Toyama Sci. Mus.*, 22: 7-38.
- Nunomura, N., 2004. Marine Isopod Crustaceans collected from Izu Peninsula, Middle Japan. *Bull. Toyama Sci. Mus.*,

27: 1-14.

- Nunomura, N., 2006. Marine Isopod Crustaceans in the Sagami Sea, Central Japan. *Mem. Natn. Sci. Mus., Tokyo*, (41): 7-42.
- Pillai, N. K. 1963. South Indian Marine Isopods. *Jour. Univ. Bombay*. 31 (3 & 5): 100-112.
- Poore, G. C. B. 1978. *Austrochaetilia capeli*, a new genus and species of chaetiline idoteid (Isopoda) from Port Phillip Bay, Australia. *Crustaceana*, 33 (2): 113-118.
- Poore, G. C. B. 1984 Clarification of the monotypic genera *Chiriscus* and *Symmius* (Crustacea: Isopoda: Idoteidae). *Proc. Biol. Soc. Washigton*, 97 (11): 71-77. asihg.
- Poore, G. C. B. 1991. Crustacea isopod: Deep-sea Chaetiliidae (Valvifera) from New Caledonia and the Philippines. *Mem. Mus. Nat. d'Hist. Nat. Paris (Zoologie)* 152: 139-153.
- Poore, G. C. B. 2001. Isopoda Valvifera: Diagnoses and relationships of the Families. *Jour. Crust. Biol.*, 21 (1): 205-230.
- Rathke, J. 1799. Jattagelser henhørende til Indvoldeormenes og Bloddyrenes Naturhistorie. *Skrivter Naturh.-Selskabet. Copenhagen*. 1 (11): 61-153
- Richardson, H. 1904. Contributions to the natural history of the Isopod. *Proc. U. S. Nat. Mus.*, 27: 1-89.
- Richardson, H. 1905. A monograph on the Isopods of North America. *Bulletin. U. S. Nat. Mus.*, 54: I-LIII+1-727.
- Richardson, H. 1909. Isopods collected in the northwest Pacific by the U. S. Bureau of Fisheries Steamer "Albatross" in 1906. *Proc. U. S. Nat. Mus.*, 37 (1701): 75-129.
- Schultz, G. A. 1981. Arcturidae from the Antarctic and southern Seas (Isopoda, Valvifera) Pt. 1, in: Biology of the Antarctic Seas X. *Antarctic Series Research Series*. 32: 63-94.
- Shiino, S. M. 1950. The marine wood-boring crustaceans of Japan. I. Limnoriidae. *Was. Jour. Biol.*, 8 (3): 333-358.
- Shiino, S. M. 1957. The marine wood-boring crustaceans of Japan II (Sphaeromidae and Cheluridae). *Was. J. Biol.*, 15 (2): 161-197.
- Stebbing, T. R. R. 1900. On some crustaceans from the Falkland Islands collected by Mr. Rupert Vallentin, FL. S. 2. *Proc. Zool. Soc. London*. 1900: 517-568.
- Thielemann, M. 1910. Beiträge zur Kenntnis der Isopoden fauna Ostasiens. *Abhandl. math.-phys. Klass. Akad. Wiss., Suppl.*, 2 (3): 1-110, 2 pls.